162 105 30-2 2013-09-23

Installation and Maintenance Manual

CTC EcoHeat 400

400V 3N~ / 230V 1N~

CTC
Enertech Group

Removing the cooling module

1. Disconnect the cooling module's power cable connector and hoses.

2. Attach the two carrying handles to the bottom of the cooling module.

3. Unscrew the cooling module's screws.

4. Pull the cooling module by first lifting the front edge slightly with the carrying handles.

5. Lift the cooling module using the carrying handles and shoulder straps.

6. Lift the cooling module into the product using the carrying handles and shoulder straps. Remove the carrying handles and reconnect the power cable, hoses and screws.

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CTC EcoHeat 400

400 V 3N~ / 230 V 1N~

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As your own reminder

Fill in the information below. It may come in useful if anything should happen.

Product :	Manufacturing number :
Installer:	Name:
Date:	Tel. no.:
Electrical installer:	Name:
Date:	Tel. no.:

Enertech AB provides the information with reservation for any typing errors and subject to modification.

Congratulations on buying your new product

You have just bought a CTC EcoHeat 400, which we hope you will be very pleased with. In the following pages you can read about how to operate and maintain your heat pump. One chapter is written for the property owner and one chapter for the installer.

Keep this handbook containing the installation and maintenance instructions. If it is looked after properly, you will be able to enjoy the use of your CTC EcoHeat 400 for many years. This manual will provide all the information you will need.

The complete heat pump

CTC EcoHeat 400 is a complete heat pump which meets your home's heating and hot water requirements. It is equipped with a motorised mixing valve which ensures correct and even temperatures are supplied to your heating system. In addition, CTC EcoHeat 400 has a built-in circulation pump for connection to ground/rock circuits, known as the "collector". This can be connected, as you wish, to the left, right or back of the heat pump.

CTC EcoHeat 400 has a control system which:

- Monitors all heat pump functions
- Permits individual settings
- Displays desired values, such as temperatures, operation times, energy consumption and fault signals
- Facilitates the setting of values and troubleshooting in a simple and well-structured way

The built-in copper coil provides copious amounts of hot water. CTC EcoHeat 400 also has a summer-time basement heating function and a floor heating block, which maximises the temperature supplied to the floor circuits. Using the integrated night reduction function, you can set and change the temperature in the house during the day, from one day to the next.

Easily accessible electrical components and cooling modules, along with effective troubleshooting functions in the control program make CTC EcoHeat 400 easy to service. It comes with a room sensor as standard, which is equipped with an LED which flashes in the event of a fault.

Check list

The check list must be completed by the installer.

- In the event of a service, this information may be called for.
- Installation shall always be done according to the installation and maintenance instructions.
- Installation shall always be carried out in a professional manner.
- Following installation, the unit shall be inspected and checked for functionality.

The points below shall be checked off.

Pipe installation

- ☐ The heat pump is filled, positioned and adjusted in the correct manner according to the instructions.
- ☐ The heat pump is positioned so that it can be serviced.
- ☐ The radiator pump's capacity for the required flow.
- ☐ Open radiator valves and other relevant valves.
- ☐ Leak test
- ☐ Bleed the system.
- ☐ Safety valve function test.
- ☐ The waste pipe is connected to the draining gutter.

Electrical installation

- ☐ Compressor, direction of rotation
- ☐ Power switch
- ☐ Correctly terminated wiring
- ☐ Requisite sensors for applicable system
- ☐ Outdoor sensors
- ☐ Room sensors (optional)
- ☐ Accessories

Customer information (adapted to the relevant installation)

- ☐ Start-up with customer/installer.
- ☐ Menus/controls for selected system
- ☐ Installation and maintenance manual supplied to the customer
- ☐ Check and filling, heating system
- ☐ Fine tuning information, heat curve
- ☐ Alarm information
- ☐ Mixing valve
- ☐ Safety valve function test
- ☐ Warranty
- ☐ Information on procedures for fault registration

_____ _____

Date / Customer Date / Installer

Important to remember!

Check the following points in particular at the time of delivery and installation:

- The product must be transported and stored in a standing position. When moving the product, it can be placed temporarily on its back.
- Remove the packaging and check before installation that the product has not been damaged in transit. Report any transport damage to the carrier.
- Place the product on a solid foundation, preferably made of concrete. **If the product needs to be placed on a soft carpet, base plates must be placed under the adjustable feet.**
- Remember to leave a service area of at least 1 m in front of the product.
- The product must not be placed below floor level either.
- Avoid placing EcoHeat in rooms with lightly insulated walls where neighbouring rooms may be disturbed by the compressor and vibrations.

Safety Instructions

The following safety instructions must be observed when handling, installing and using the heat pump:

- Electrical isolation must be carried out before maintenance, repair or installation commences.
- Correct flushing of the system shall be carried out before the system is filled with a recommended brine/heating fluid.
- When handling the product with a hoist ring or similar device, make sure that the lifting equipment, eyebolts etc. are not damaged. Never stand under the hoisted product.
- Never jeopardize safety by removing bolted covers, hoods or similar.
- Never jeopardize safety by deactivating safety equipment.
- Any work carried out on the refrigeration circuit cooling element should be done by authorised personnel only.
- Safety valve check:
  -The safety valve for heat pump/heating system and domestic hot water (DHW) must be checked on a regular basis. See the chapter on Operation and maintenance.

! If these instructions are not followed when installing, operating and maintaining the system, Enertech's commitment under the applicable warranty terms is not binding

Your home's heating installation

The House Heating Curve

The heating curve is the central part of the product's control system. It is the heating curve which determines the compensated flow temperature requirements for your property dependent upon the outdoor temperatures. It is important that the heating curve is correctly adjusted, so that you achieve the best operation and economy possible.

One property requires a radiator temperature of 30 °C when the outdoor temperature is 0 °C, whilst a different property requires 40 °C. The difference between different properties is determined by the radiator surface area, the number of radiators and how well insulated the house is.

> **!** The set heating curve is always given priority. The room sensor can only increase or decrease the compensated flow temperature to a certain extent above the set heating curve. Where operating without a room sensor, the selected heating curve determines the flow temperature supplied to the radiators purely from the outside temperature reading.

Adjustment of Default Values for the Heating Curve

You define the heating curve yourself for your property by setting two values in the product control system. This is achieved by selecting the options Inclination or Adjustment under the Installer/Settings/Radiator system menu. Ask your installer to help you set these values.

It is extremely important to set the heating curve and, in some cases, unfortunately, this process may take several weeks. The best way of doing this, upon the initial start-up, is to select operation without any room sensor. The system then operates using the outdoor temperature reading and the property's heating curve only.

During the adjustment period it is important that:

- the night reduction function is not selected.
- all thermostat valves on the radiators be fully opened.
- the outdoor temperature is not higher than +5 °C. (If the outdoor temperature is higher when the system is installed, use the factory set curve until the outdoor temperature falls to a suitable level.)
- the radiator system is operational and correctly adjusted between different circuits.

Appropriate Default Values

During installation you can seldom achieve a precise setting for the heating curve instantly. In this case, the values given below may provide a good starting point. Radiators with small heat-emission surfaces require a higher primary flow temperature. You can adjust the gradient (heating curve gradient) for your heating system under the Installer/Settings/Radiator system menu.
Recommended values are:

Floor heating only	Inclination 35
Low temperature system (well insulated houses)	Inclination 40
Normal temperature system (factory setting)	Inclination 50
High temperature system (older houses, small radiators, poorly insulated)	Inclination 60

Adjusting the heating curve

The method described below can be used to adjust the heating curve correctly.

Adjustment if it is too cold indoors

- If the outdoor temperature is **lower** than 0 degrees:
  Increase the Inclination value by a couple of degrees.
  Wait 24 hours to see if any further adjustment is required.
- If the outdoor temperature is **higher** than 0 degrees:
  Increase the Adjustment value by a couple of degrees.
  Wait 24 hours to see if any further adjustment is required.

Adjustment if it is too warm indoors

- If the outdoor temperature is **lower** than 0 degrees:
  Decrease the Inclination value by a couple of degrees.
  Wait 24 hours to see if any further adjustment is required.
- If the outdoor temperature is **higher** than 0 degrees:
  Decrease the Adjustment value by a couple of degrees.
  Wait 24 hours to see if any further adjustment is required.

! If the values set are too low, this may mean that the desired room temperature is not being reached. You then need to adjust the heating curve, as necessary, following the method shown above.
When the basic values have been set more or less correctly, the curve can be finely adjusted directly using the Room temp. shown on the home menu screen.

Description of inclination and adjustment

Inclination 50:
The value set is the outgoing temperature of the water supplied to the radiators at an outdoor temperature of –15 °C, e.g. 50 °C. A lower value is selected where a radiator system has large radiator areas (a low temperature system). Floor heating systems require low temperatures. A low value should therefore be selected. The value must be increased for high temperature systems to achieve a high enough indoor temperature.

Adjustment 0:
The adjustment means that the flow temperature can be raised or lowered at a specific outdoor temperature.
Adjustment 0 means 50 °C primary flow when the outside temperature is -15 °C.
Adjustment -5 means 45 °C primary flow when the outside temperature is -15 °C.

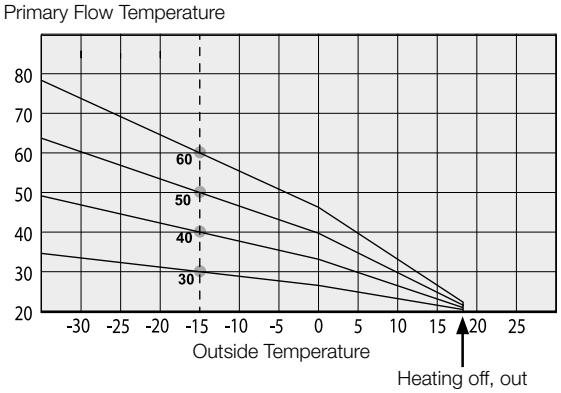
For example:
Inclination 50 means that the temperature of the water supplied to the radiators will be 50 °C when the outdoor temperature is –15 °C (if adjustment is set to 0). If the adjustment is set to +5, the temperature will be 55 °C instead. The curve is increased by 5 °C at all temperatures, i.e. it is parallel displaced by 5 °C.

Examples of Heating Curves

You can see in the diagram below how the heating curve changes with different Inclination settings. The gradient of the curve shows the temperatures that the radiators require at different outdoor temperatures.

Curve Inclination

The inclination value which is set is the primary flow temperature when the outside temperature is –15 °C.

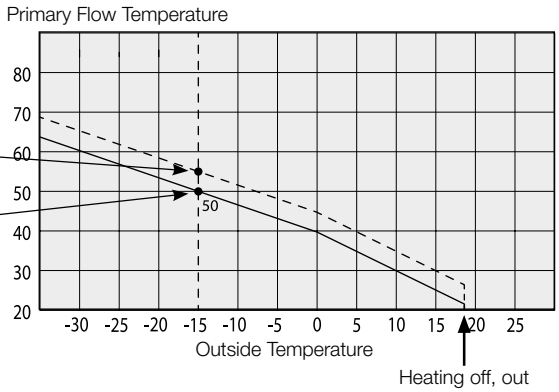


Adjustment

The curve can be parallel displaced (adjusted) by the desired number of degrees to adapt to different systems/ houses.

Inclination 50 °C
Adjustment +5 °C

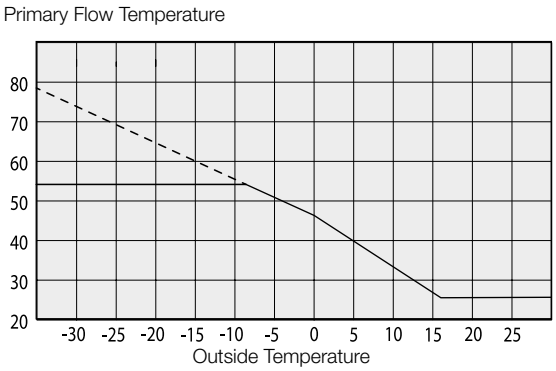
Inclination 50 °C
Adjustment 0 °C



An example

Inclination 60 °C
Adjustment 0 °C

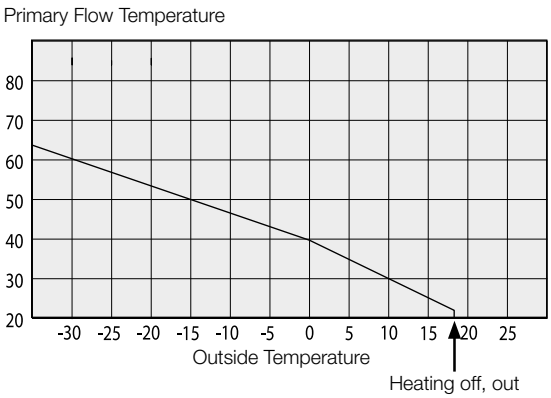
In this example, the maximum outgoing primary flow temperature is set at 55 °C.
The minimum permitted primary flow temperature is 27 °C (e.g. summer-time basement heating or the floor circuits in a bathroom).



Summer-time operation

All properties have internal heat gains (lamps, oven, personal heat etc.), which means that the heating can be switched off when the outdoor temperature is lower than the desired room temperature. The better insulated the house is, the earlier the heating from the heat pump can be switched off.

The example shows the product set at the default value of 18 °C. This Heating off value can be changed under the Installer/Settings/Radiator system menu.
When the heat is switched off in this way, the radiator pump stops and the mixing valve is shut down. The heating starts up automatically when it is required again.



1. Technical Data

1.1 Three-phase 400V 3N~

Electrical Data		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Electrical data		400V 3N~			
Rated power	kW	11.7	12.6	13.4	14.1
Immersion heater (steps of 0,3 kW)	kW	0 - 9.0			
Max immersion heater output @ fuse size 16 / 20 / 25 A	kW	6.9 / 7.8 / 9	2.1 / 7.8 / 9	2.1 / 7.2 / 9	2.1 / 6.9 / 9
IP class		IPX1			

Operational data for heat pump			EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Output from compressor [1]	@ -5/45	kW	4.68	6.84	8.33	9.88
COP [1]	@ -5/45	-	3.09	3.34	3.30	3.30
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	5.90 | 5.48 5.17	8.19 | 7.87 7.55	9.97 | 9.55 9.28	11.75 | 11.24 10.97
COP [1]	@ 0/35 | 0/45 0/55	-	4.57 | 3.54 2.76	4.58 | 3.64 2.99	4.60 | 3.68 2.98	4.60 | 3.66 2.96
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	6.81 | 6.49 6.08	9.44 | 9.05 8.65	11.42 | 10.99 10.58	13.53 | 12.95 12.57
COP [1]	@ 5/35 | 5/45 5/55	-	5.24 | 4.15 3.18	5.02 | 4.04 3.30	5.20 | 4.16 3.28	5.11 | 4.11 3.35
Max. operating current Compressor		A	4.5	5.2	6.8	8.2

[1] EN14511:2007, incl. heating medium pump and brine pump

Heating system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume. thermal store (V)	l	223			
Max. operating pressure. thermal store (PS)	bar	2.5			
Max. temperature. thermal store (TS)	°C	110			
Heating system. min. flow	l/s	Unlimited			
Heating system. nominal flow [2]	l/s	0.14	0.20	0.24	0.28
Pressure drop for mixing valve heating		See pressure drop diagram in the Pipe installation chapter			

[2] Δt = 10 K and 0/35 °C heat pump operation

Brine system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume (V)	l	2.3	2.9	2.9	3.4
Brine system min./max. temp. (TS)	°C	-5/20			
Brine system min./max. pressure (PS)	bar	0.2/3.0			
Brine pump speed adjustment		3			
Brine system min. flow, Δt = 5 °K	l/s	0.27	0.31	0.38	0.44
Brine system nominal flow, Δt = 3 °K	l/s	0.37	0.51	0.64	0.73
Brine system pump		TOP-S 25/7			TOP-S 25/10
Pump capacity		See diagram in the Pipe installation chapter			

Hot water system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume, hot water coil (V)	l	5.7			
Max. operating pressure, hot water coil (PS)	bar	10			
Max. temperature, hot water coil (TS)	°C	110			

Other data		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Refrigerant quantity (R407C)	kg	2.1	2.1	2.1	2.5
Interrupt value switch HP	MPa	3.1 (31 bar)			
Weight	kg	267	270	272	279
Width x Height x Depth	mm	595 x 1904 x 672			
Minimum ceiling height	mm	1925			
Noise level	dB(A)	44,9	43,9	46,0	47,2

1.2 Single phase 230V 1N~

Electrical Data		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Electrical data		230V 1N~			
Rated power	kW	11.7	12.6	13.4	14.1
Immersion heater (steps of 0,3 kW)	kW	0 - 9.0			
Min. main fuse @ 3.5 / 5.5 / 9.0 kW Immersion heater	A	30 / 38 / 54	34 / 43 / 58	37 / 46 / 61	41 / 49 / 65
IP class		IPX1			

Operational data for heat pump			EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Output from compressor [1]	@ -5/45	kW	4.68	6.84	8.33	9.88
COP [1]	@ -5/45	-	3.09	3.34	3.30	3.30
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	5.90 | 5.48 5.17	8.19 | 7.87 7.55	9.97 | 9.55 9.28	11.75 | 11.24 10.97
COP [1]	@ 0/35 | 0/45 0/55	-	4.57 | 3.54 2.76	4.58 | 3.64 2.99	4.60 | 3.68 2.98	4.60 | 3.66 2.96
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	6.81 | 6.49 6.08	9.44 | 9.05 8.65	11.42 | 10.99 10.58	13.53 | 12.95 12.57
COP [1]	@ 5/35 | 5/45 5/55	-	5.24 | 4.15 3.18	5.02 | 4.04 3.30	5.20 | 4.16 3.28	5.11 | 4.11 3.35
Max. operating current Compressor		A	13.0	18.5	20.6	25.0

[1] EN14511:2007, incl. heating medium pump and brine pump

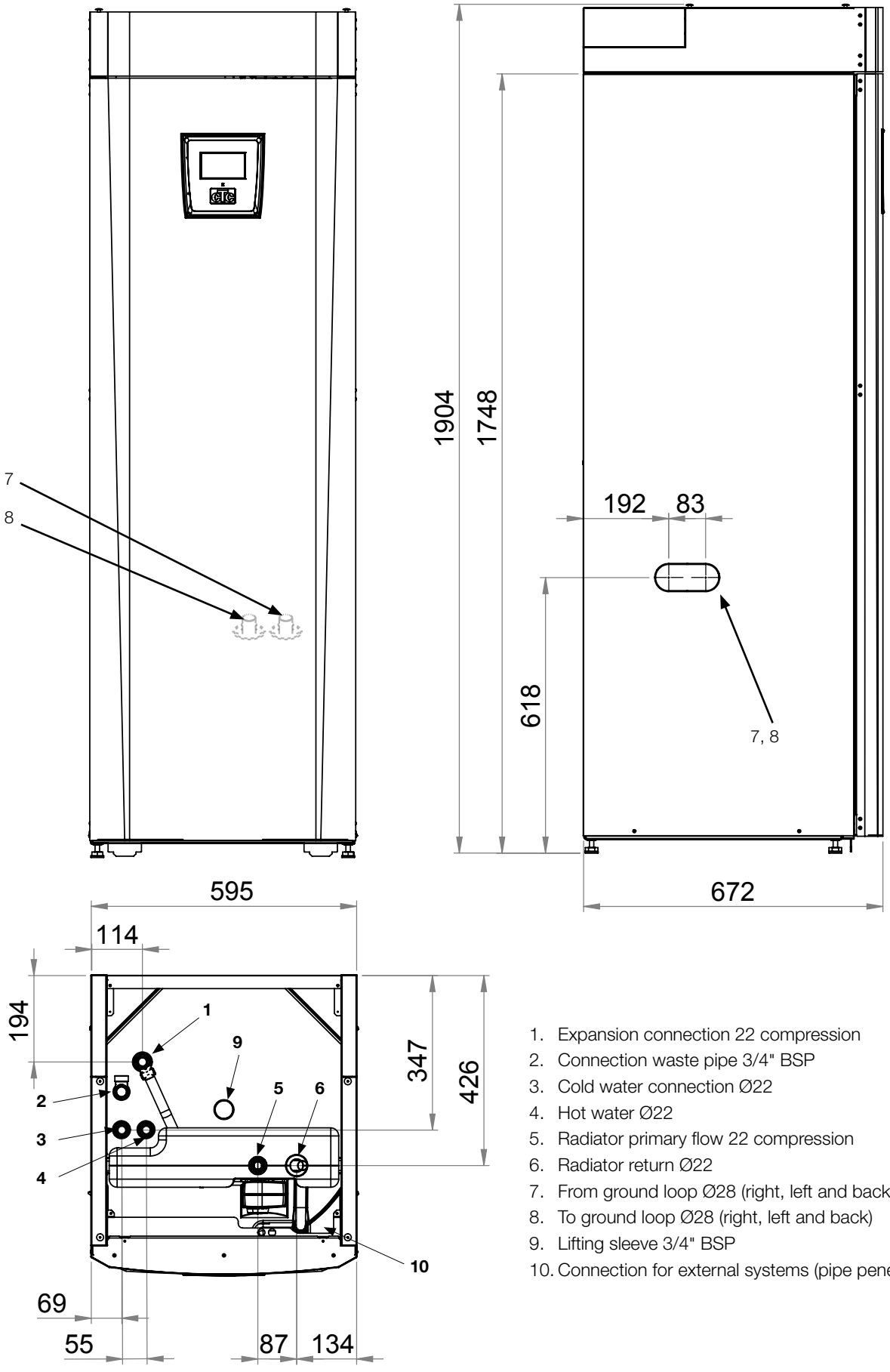
Heating system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume. thermal store (V)	l	223			
Max. operating pressure. thermal store (PS)	bar	2.5			
Max. temperature. thermal store (TS)	°C	110			
Heating system. min. flow	l/s	Unlimited			
Heating system. nominal flow[3] Δt = 10 K	l/s	0.14	0.20	0.24	0.28
Pressure drop for mixing valve heating [3] At Δt = 10 K and 0/35 °C heat pump operation		See pressure drop diagram in the Pipe installation chapter			

Brine system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume (V)	l	2.3	2.9	2.9	3.4
Brine system min./max. temp. (TS)	°C	-5/20			
Brine system min./max. pressure (PS)	bar	0.2/3.0			
Brine pump speed adjustment		3			
Brine system min. flow, Δt = 5 °K	l/s	0.27	0.31	0.38	0.44
Brine system nominal flow, Δt = 3 °K	l/s	0.37	0.51	0.64	0.73
Brine system pump		TOP-S 25/7			TOP-S 25/10
Pump capacity		See diagram in the Pipe installation chapter			

Hot water system		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Water volume, hot water coil (V)	l	5.7			
Max. operating pressure, hot water coil (PS)	bar	10			
Max. temperature, hot water coil (TS)	°C	110			

Other data		EcoHeat 406	EcoHeat 408	EcoHeat 410	EcoHeat 412
Refrigerant quantity (R407C)	kg	2.1			
Cut-out value pressostat HP	MPa	3.1 (31 bar)			
Weight	kg	255	258	260	267
Width x Height x Depth	mm	600 x 1850 x 642			
Minimum ceiling height	mm	1925			
Noise level	dB(A)	44,9	43,9	46,0	47,2

1.3 Measurements and connections



1. Expansion connection 22 compression
2. Connection waste pipe 3/4" BSP
3. Cold water connection Ø22
4. Hot water Ø22
5. Radiator primary flow 22 compression
6. Radiator return Ø22
7. From ground loop Ø28 (right, left and back)
8. To ground loop Ø28 (right, left and back)
9. Lifting sleeve 3/4" BSP
10. Connection for external systems (pipe penetration)

2. CTC EcoHeat 400 design

The picture below shows the fundamental construction of the heat pump. The energy in the lake or ground is drawn up by the cooling system. The compressor then increases the temperature to a usable level. Afterwards it releases the energy for the heating system and hot water.

Mains Water Connections
Here you connect the property's mains water connections. The cold water is directed down to the lower part of the coil.

Upper part
In the upper part of the coil the water is heated to the desired temperature.

Finned Coil for Hot Water
EcoHeat is equipped with a well-dimensioned finned coil made of copper. A low temperature can be maintained without the risk of legionella bacteria.

Electric heater
A built-in electric heater acts as an auxiliary heater if the heat pump's output is not sufficient.

Lower part
In the lower part of the coil the hot water is pre-heated by the water heated by the heat pump. The major section of the coil is located in this part.

Heat medium pump
The adjustable-speed heat medium pump transports the cold water from the heating system to the condenser where the energy from the ground loop is drawn up and directed towards the heat pump.

Compressor
The compressor is the “heart” of the cooling system, pumping the refrigerant around in an airtight closed system. The evaporated refrigerant is compressed in the compressor. This enables the temperature to rise to a usable level. The energy is released to the heating system in the condenser.

Bivalent Mixing Valve
The automated mixing valve ensures that an even heat is continuously supplied to the radiator system. The valve has four ports and first collects the radiator water from the lower part, heated by the heat pump

Insulation
The heat pump's tank is insulated with die-cast polyurethane foam for minimal heat loss.

Diverting valve
The heated water from the condenser heats up either the upper or lower part of the tank.

Condenser/Evaporator
In the condenser the refrigerant releases its energy into the heating system. The energy is used to heat the hot water and the house.
In the evaporator the heat drawn from the heat source (lake or ground) is released to the refrigerant, which is evaporated to be compressed later in the compressor.

Sound insulation
The cooling module is fitted with sound insulation as the compressor emits a certain amount of noise and vibrations.

Brine pump
The brine pump transports the freeze resistant water in the ground loop (cold side). The cold side is a closed system.

Expansion valve
The cooling system has a high pressure side (after the compressor) and a low pressure side (after the expansion valve). The expansion valve has the function of lowering the pressure on the refrigerant. This makes the temperature drop so that new energy can be drawn up into the evaporator. The expansion valve functions as a variable throttle valve depending on the current conditions in the cooling system.

3. Control system

3.1 Some control data

EcoHeat automatically adjusts the water temperature to the primary flow's current heating requirement. This is completely normal and is monitored by the control system, which continuously ensures that you are provided with optimum function and economy.

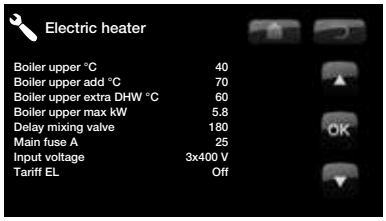
- Compressor: 5 °C between start and stop. The compressor stops at the setpoint and starts at 5 °C lower.
- The heat pump's setpoint is 5 °C higher than the setpoint for the primary flow down to a heat pump temperature of 35 °C.
- Changing the room temperature leads directly to a change in the primary flow's setpoint.
- The discharge is monitored and the compressor stopped at 120 °C.
- Incoming brine temperature: alarm triggered at -5 °C.

3.2 Factory values

The product is delivered with set factory values which are suitable for a standard house with a standard radiator system. These values can be easily changed as required. You should check in particular your “home parameters”. Ask your installer to help you determine the correct values.
The following default values are set by the factory:

Night reduction:	Off (constant day temperature)
Compressor:	Blocked
Temp. electrical unit:	40 °C (low value recommended)
Room sensor:	No
Electric boiler max. kW:	5.5
Additional heat delay (mixing valve):	180 minutes
Main fuse:	20 A
Extra DHW:	No (if “Yes” is selected, 120 min. time is activated, not the scheduled time)
House parameters:	Inclination = 50 Adjustment = 0

! When the product is reset to factory settings, the parameter Input voltage is reset to 3x400V by default. For 1x230V please re-set the correct value under Installer/Settings/ Electric heater/.



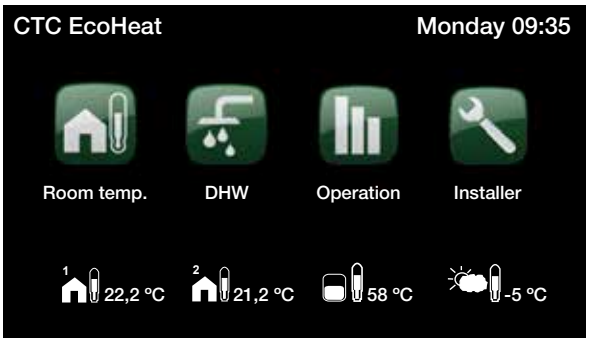
3.3 My settings

(use a pencil so that you can make changes)

Indoor °C	_____	Adjustment	_____
Boiler upper max kW	_____	Max primary flow °C	_____
Boiler °C	_____	Min primary flow °C	_____
Delay mix valve min	_____	Night reduction: Room temp reduced °C	_____
Main fuse A	_____	Night reduction: Prim reduced °C	_____
Inclination	_____		

4. Detail Description Menus

All the settings can be configured directly on screen using the well-structured control panel. The large icons operate as buttons on the touch display.
Operational and temperature information is also displayed here. You can easily enter the different menus to find operational information or to change any settings.



4.1 Start menu

This menu is the system's start menu. This provides an overview of the current operational data.
The system returns to this menu if no buttons are pressed within a 10-minute period.
All other menus can be accessed from this menu.

Room temp.
Settings for raising or lowering the temperature indoors and also for scheduling temperature changes.

DHW
Settings for DHW production.

Operation
This displays current operational data for both your heating system and heat pump. Historical operational data is also available.

Installer
This option is used by the installer to configure the settings and servicing for your heating system.

Room temp. Radiator system 1
If radiator system 1 is defined, the current room temperature is displayed here.

Room temp. Radiator system 2
If radiator system 2 is defined, the current room temperature is displayed here.

Tank temperature
This displays the current temperature in the upper part of the tank.

Outdoor temperature
This displays the current outdoor temperature.

Home
The Home button takes you back to the Start menu.

Return
The Return button takes you back to the previous level.

OK
The OK button is used to mark and confirm text and options in the menus.

Night reduction
This schedules a temperature reduction at night if selected.

Holiday
You can use this to reduce the room temperature permanently, e.g. during holidays when the house is unoccupied.

Weekly program
This reduces the temperature for a few days, for instance, if you commute every week.

Stored operation data
This displays historical data.

Time/Language
This is used to set the date, time and the language you want the menu to be displayed in.

Settings
The settings for operating the heat pump and system are usually configured by the installer.

Define system
The heating system's structure can be adjusted/ modified using this option.

Service
Advanced settings are configured by the appropriate technical person.

4.2 Room temp.

You set the room temperature you want to achieve via this menu. Use the plus and minus buttons to set the temperature you want, which gives you the “setpoint” temperature, in brackets. You can see the current value next to the brackets.

If two radiator systems are installed, the values for both are displayed.

If you want to schedule a temperature reduction, you can continue to the Night reduction or Holiday submenus.

You can select Room sensor No under the Installer/Define system/Radiator system menu. This can be done if the room sensor is poorly positioned, if the floor heating system has a separate room sensor or if you use a fire place or open stove. The alarm LED on the room sensor still functions as normal.

If you use the fire or open stove only occasionally, the firing process can affect the room sensor and reduce the temperature supplied to the radiators. It can then get cold in the rooms in other parts of the house. The room sensor can temporarily be deselected during the firing process. EcoHeat then provides heating to the radiators using the set heating curve. The radiator thermostats reduce the heating supplied to the section of the house where a fire is burning.

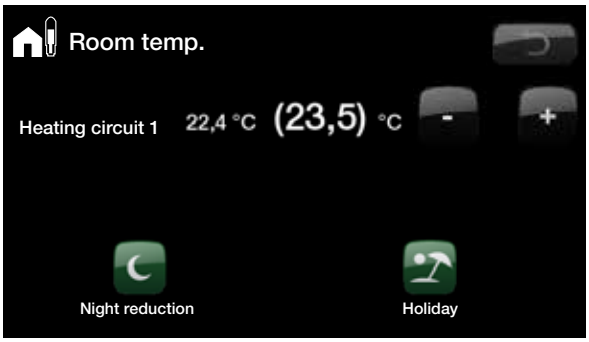
4.2.1 Setting Room temp without a sensor

If a room sensor has not been installed you use this option to adjust the room temperature by trimming the flow temperature. If the extent of the trimming does not alter the room temperature enough, then you have to adjust the default setting under Installer/Settings/Radiator system. Change the value in small steps every time (approx. 2-3 steps) and wait for the result (about a day) as the system is slow to respond.
Several adjustments may be necessary at different outdoor temperatures, but you will gradually achieve the right setting for the property.

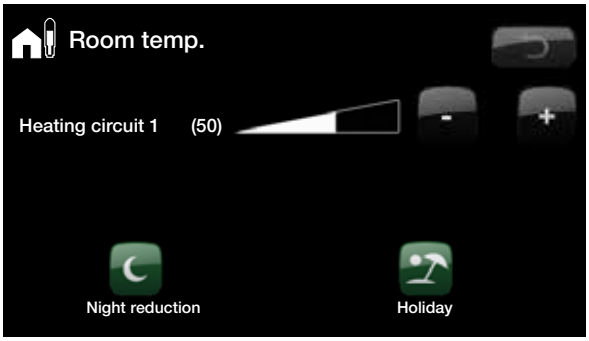
4.2.2 Outdoor Sensor/Room Sensor Faults

If a fault occurs with an outdoor sensor, an outdoor temperature of -5 °C is simulated so that the house does not get cold. The product's alarm is triggered.

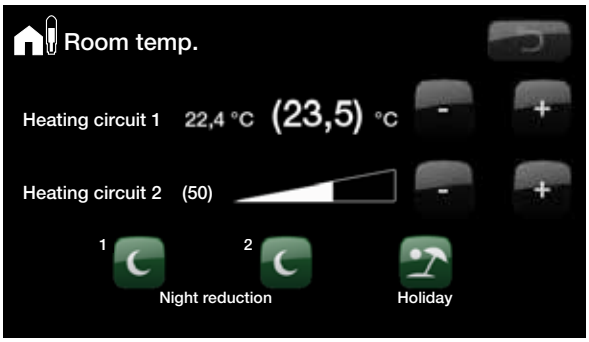
If a fault occurs with a room sensor, EcoHeat automatically switches to operating according to the set curve. The product's alarm is triggered.



The example above shows that the room temperature is 22.4 °C, but the desired value (setpoint) is 23.5 °C.



The example above shows how it operates without a room sensor. The value in brackets is a % rate. You can finely adjust the system's default setting using the plus and minus buttons.



The example above shows how it operates with two radiator systems. Radiator system 1 with a room sensor and radiator system 2 without one.

> **!** The radiator thermostatic valves must be held fully open when the system is tuned.

4.2.3 Night reduction temperature

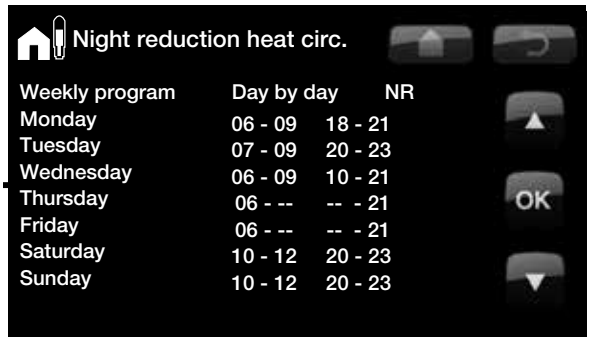
You use this menu to activate and set a reduction in the temperature at night. A night reduction means that you reduce the temperature indoors during scheduled periods, for example, at night or when you are working.

The value by which the temperature is reduced - Room temp. red – is set under Installer/Settings/Radiator system/ Factory value: -2 °C.

The options are Off, Day by day or Block. If you select Off, no reduction is made at all.

Day by day menu
You use this menu to schedule a reduction on the days of the week. This schedule is repeated every week.

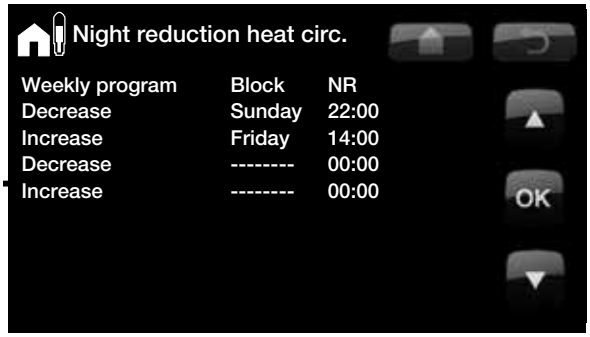
The time set is when you want the temperature to be normal. The night reduction function is activated during the rest of the time.



On Monday morning at 6 am the temperature is increased to normal; at 9 am it is reduced to the set night reduction temperature. At 6 pm the temperature is increased again until 9 pm when the night reduction function reduces it again.

> **!** Reducing a heat pump's temperature at night is a comfort setting which generally does not reduce energy consumption.

Block
This menu allows you to set a reduction for a few days during the week, for example, if you are working elsewhere on weekdays and at home at weekends.



On Sunday at 10 pm the temperature is reduced with the value set for Room temp. being reduced. On Friday at 2 pm the temperature is increased to the set value again.

4.2.4 Holiday

You use this option to set the number of days that you want the set night reduction temperature to be constantly reduced. For example, if you want to go on holiday.

You can apply this setting for up to 250 days.

The period starts from the time you set this parameter for.

> **!** The value by which the temperature is reduced - Room temp. red – is set under Installer/Settings/Radiator system/
> Factory value: -2 °C.

4.3 DHW

You use this to set the DHW comfort level you want and extra DHW.

Temperature

You set the values for this option which apply to the heat pump's normal operation. There are three modes:

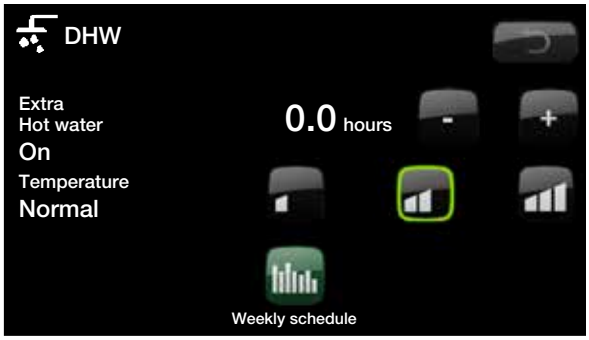
Economic - If you have a small DHW requirement.

Normal - Normal DHW requirement.

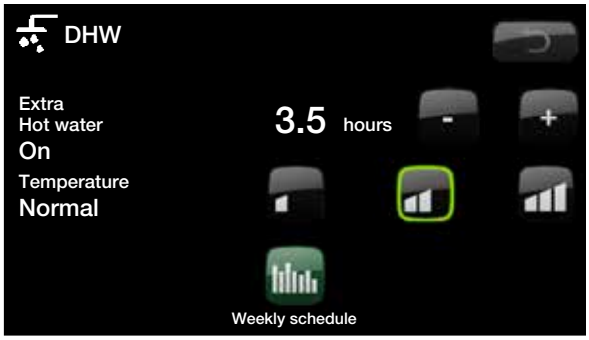
Comfort - Large DHW requirement.

Extra DHW **(On/Off)**

You select this option if you want to activate the Extra DHW function. When this function is activated, the heat pump starts producing extra hot water immediately. You also have the option to schedule DHW production for certain times using the Weekly program function, which is recommended.



Tip: You should start with Economic mode and if you find that you are not getting enough hot water, increase to Normal etc.



The example above shows that Extra DHW is set to On for 3.5 hours.

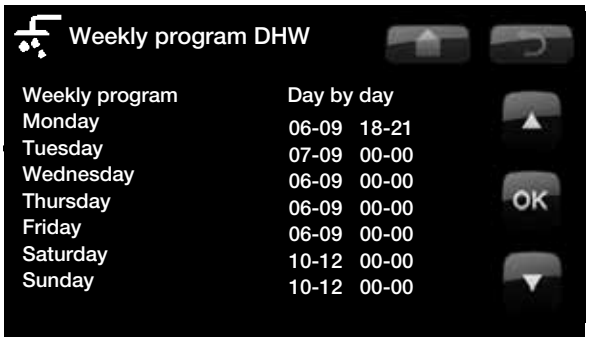
4.3.1 Weekly program DHW

You can use this menu to schedule periods during weekdays when you want extra hot water. This schedule is repeated every week. The screen shows the factory values, which can be changed. If you want an additional period some day, e.g. in the evening, you can program recurring times.

The options are Off or Day by day.

Off - No scheduled DHW production.

Day by day - A weekly schedule which you program yourself. This is used if you always know when you repeatedly need extra hot water, for instance, during the morning and evening.



On Monday morning at 6 am the system starts producing more hot water until 9 am when the temperature returns to normal again. There is a further increase between 6 pm and 9 pm.

Tip: Set the time approx. 1 hour earlier than you need the hot water as it take some time to heat up the water.

4.4 Operation

This menu displays current temperatures and the operational data for your heating system.

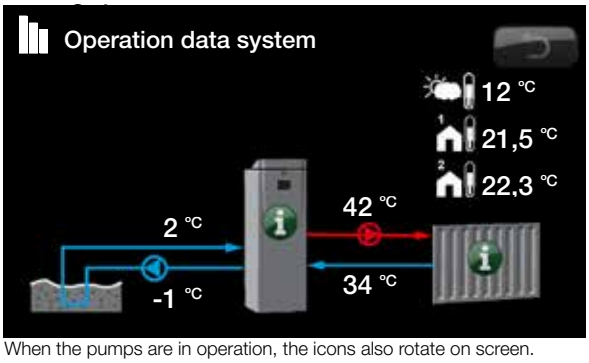
The screen shows the incoming and outgoing temperatures from the heat pump.

Brine in
At the top left of the heat pump (2 °C) the brine's current temperature is shown from the collector to the heat pump.

Brine return
The bottom left value (-1 °C) is the return temperature of the brine going back into the collector hose. The values vary during the year according to the heat source's capacity and the energy drawn out.

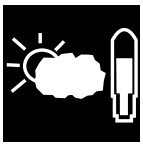
Primary flow radiators
At the right of the heat pump (42 °C) the temperature of the primary flow to the house's radiators is shown. This value will vary during the year according to the parameters set and the current outdoor temperature.

Return radiators
At the bottom right (34 °C) the return temperature is shown for the radiator water returning to the heat pump. This value will vary during operation according to the parameters set, the radiator system's capacity and the current outdoor temperature.



When the pumps are in operation, the icons also rotate on screen.

Information
Press the information button to display the operational data for the relevant item.

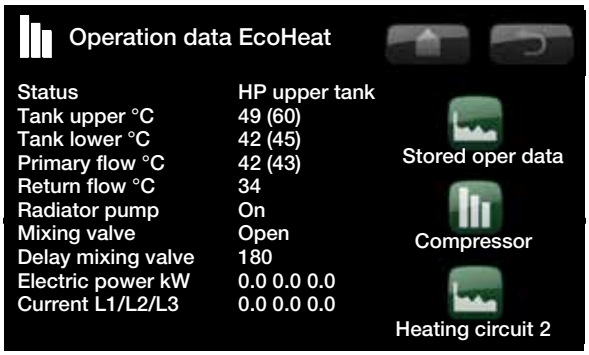


Current outdoor temperature
Shows the current outdoor temperature. The control system uses this value to calculate the various operational parameters.

Current indoor temperature
Shows the current room temperature (if a room sensor is selected during operation). If two radiator systems are installed, the values for both are displayed.

4.4.1 Operation data CTC EcoHeat

This menu displays current temperatures and the operational data for your EcoHeat system. The first figure is the actual operational value, with the value in brackets being the setpoint which the heat pump is trying to achieve.



Three Current values are displayed when the current sensors (CTs) are connected and identified. If only one figure is displayed:
- connect all three CTs
- then select the option Installer/Service/Control current sensors.

Status

Shows the heat pump's operational status. The various operational status options are:

- **HP upper tank**
  The heat pump heats up the upper part of the tank (DHW production).
- **HP lower tank**
  The heat pump heats up the lower part of the tank (Heat production).
- **HP + Add**
  Both the electric heater and heat pump are operating to heat up the tank.
- **Add**
  The electric heater heats up the tank on its own.

Tank upper °C

Shows the temperature in the upper part of the tank. (Stops hot water charging)

Tank lower °C

Shows the temperature in the lower part of the tank.

Primary flow °C

Shows the temperature supplied to the system's radiators, along with the temperature which the system is trying to achieve. This value will vary during the year according to the parameters set and the current outdoor temperature.

Return flow °C

Shows the temperature of the water returning from the radiator system to the heat pump.

Radiator pump

Shows the radiator pump's operational status.

Mixing valve

Shows whether the mixing valve increases (opens) or reduces (closes) the heat supplied to the radiators. When the correct temperature has been achieved with the mixing valve, the valve's motor then remains stationary.

! The first figure is the actual operational value, with the value in brackets being the setpoint which the heat pump is trying to achieve.

! The current value for the lower tank may be higher than the setpoint for the lower tank. This is due to the heat from the upper tank affecting the lower tank by a temporary breakdown in stratification.

Delay mixing valve

A microswitch in the mixing valve's motor ensures that auxiliary heating is not used unnecessarily, for example, when ventilating a room or if the temperature (outdoors) occasionally drops during the night. The mixing valve delays the time period selected before heat is drawn from the product's electric unit.

Electric power kW

Shows the boiler's additional power (0…9.0 kW).

Current A

Shows the system's total current consumption at the various phases L1/L2/L3, provided that three current sensors (accessories) have been fitted to the unit's incoming cables. If the current sensors are not identified, only the phase with the highest load is displayed.
If the current exceeds the main fuse size, the electric heat pump automatically switches down a power step to protect the fuses, for example, when several high-consumption appliances are being used in the house.

4.4.2 Stored operation data

Heat pump

This menu shows the operational values for the heat pump over a long period.

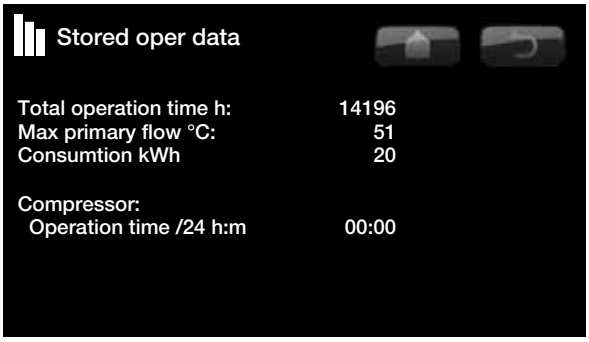
Total Operating Time h
Shows the total time during which the product has been on.

Maximum Primary Flow °C
Shows the highest temperature supplied to the radiators. The value may indicate the radiator system's/house's temperature requirements. The lower the value during the winter period, the more suitable for the heat pump's operation.

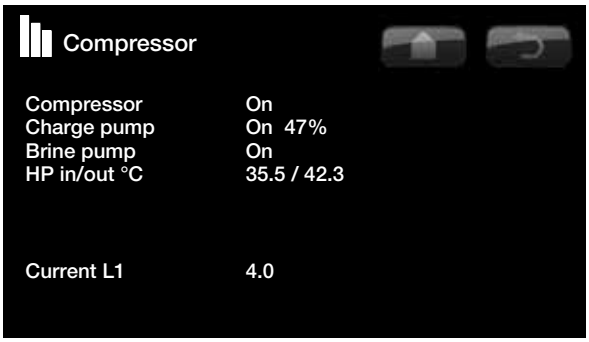
Consumtion kWh
Displays how much electricity the product used.

Compressor

Operation time /24 h:m
Displays the compressor's operating time the past 24 hours.



4.4.3 Operation data compressor



This menu is intended for servicing and advanced troubleshooting.

Compressor (On....Off)
Shows whether the compressor is operating or not.

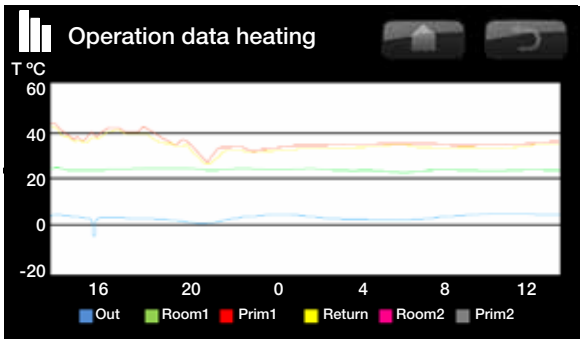
Charge pump (On....Off)
Shows the charge pump's operational status and flow as a percentage.

Brine pump (On....Off)
Shows whether the brine pump is operating or not.

HP in/out °C
Shows the heat pump's return and primary flow temperatures.

Current L1
Shows the current across the compressor (phase L1).

4.4.4 Operation data heating



This displays the heating system's operational data for the last 24 hours. The furthest point to the right is the present, while the data for the last 24 hours is displayed to the left. The time “rolls” forward.

The blue curve is the current outdoor temperature.

Green/pink curves are room temperatures 1 and 2.

Red/grey curves are primary flow temperatures 1 and 2.

The yellow curve is the heat pump's return temperature.

4.5 Installer

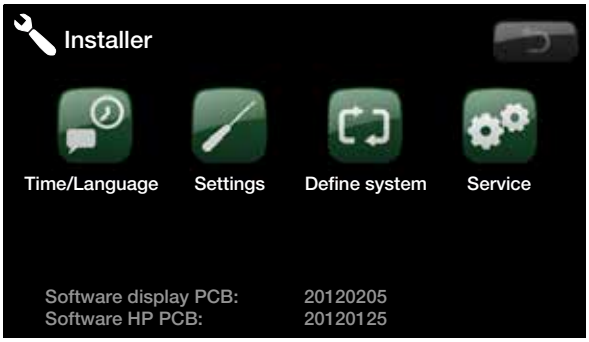
This menu contains four submenus: Time/Language, Settings, Define system and Service.

Time/Language includes time and language settings for your CTC EcoHeat 400.

Settings are used both by the installer and users for installing the system.

Define system is used by the installer to define your heating system.

Service is used for troubleshooting and diagnosis. You will find here the options Function test, Alarm history, Factory settings code, Quick start compressor and Software update.



4.5.1 Time/Language

You use this to set the date and time. The clock saves the settings in the event of a power cut. Summer/winter time is changed automatically.

Time settings

When a green box appears around the time, press OK and the first value is selected. Use the arrows to set the correct value.

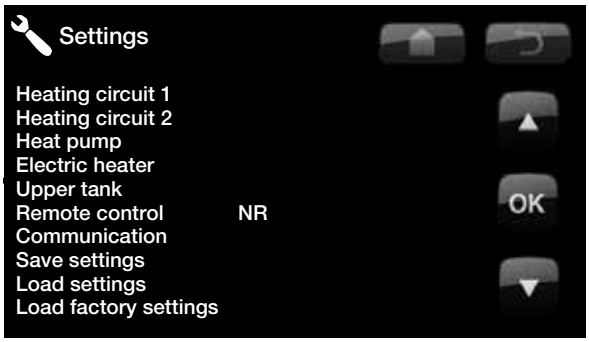
When you press OK, the next value is highlighted.

Setting the language

The current language has a green circle around it.

4.5.2 Settings

This menu is used to set the parameters for your home's heating requirements. It is important that this default setting is adjusted for your property. Values which are set incorrectly may mean that your property is not warm enough or that an unnecessarily large amount of energy is being used to heat your property.



Radiator system 1 (or 2)

Max primary flow
The maximum permitted temperature supplied to the radiators. This functions as an “electronic” limiter to protect floor circuits in underfloor heating systems.

Min primary flow
You can use this option to set the minimum permitted temperature if you want a specific level of background heating during the summer in the basement or underfloor circuits, e.g. in the bathroom. The heating in other parts of your property should then be switched off using thermostatic radiator valves or shut-off valves. Note that the radiator pump will operate the whole summer.

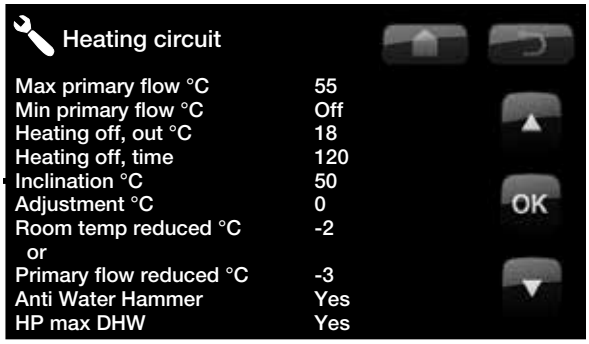
This means that the temperature supplied to the radiators does not fall below a selected temperature, for example +27 °C. Operating radiator thermostats or shut-off valves are required in the rest of the house to achieve this. These shut off the heating in the rest of the house.

Heating off, out
Outdoor temperature limit at which the house no longer requires heating. The radiator pump stops and the mixing valve is kept closed. The radiator pump is activated daily for a short period so that it does not jam. The system restarts automatically when heating is required.

Heating off, time
The delay period before the radiator pump stops as described above.

Curve Inclination
Inclination means the temperature your property needs at different outdoor temperatures. See more detailed information about this in the chapter on on Your property's heating installation. The value set is the outgoing flow temperature to radiators when the outdoor temperature is -15 °C.

Adjustment
The adjustment means that the temperature level can be raised or lowered at a specific outdoor temperature.



! Tip: Read more about these settings in the chapter on Your property's heating installation.

For example:
Inclination 50 means that the temperature up to the element will be 50 °C when the outside temperature is -15 °C, if the adjustment is set to 0. If the adjustment is set to +5, the temperature will be 55 °C instead. The curve is increased by 5 °C for all outdoor temperatures, i.e. the curve is parallel displaced by 5 °C.

Room temp reduced/Primary flow reduced
Room temp reduced indicates whether a room sensor is installed. Otherwise, Primary flow reduced is displayed.

Room temp reduced **-2 (0...-40)**
You define here how many degrees the room temperature will be reduced by during the various scheduled reduction periods, e.g. Night reduction, Holiday etc.

Example:
Room temp red -2 means that the room temperature is reduced by 2 °C from its normal temperature.

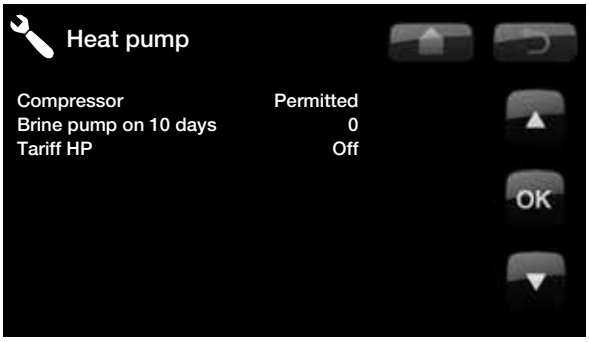
Primary flow reduced **-3 (0...-40)**
If there is no room sensor installed, Prim reduced is displayed instead.

Example:
As a general rule, a Prim reduced value of 3-4 °C is equivalent to a 1 °C reduction in room temperature in a normal system.

Anti Hater Hammer **Yes**
Anti Hater Hammer means that the heat pump never switches over and heats the upper tank (hot water charging). This is provided solely by the electric heater. In summer mode however, i.e. if the outdoor temperature is above the limit (Heating off, out), the heat pump will be allowed to send water to the upper tank.

HP max DHW **Yes**
HP max DHW is used together with Anti Hater Hammer. If you activate HP max DHW, the heat pump will switch to full condensation and work towards 60 °C tank temperature every fourth start. Doing this will increase the temperature in the tank and also provide a boost to the hot water need when exact primary flow is activated.

Heat pump



Compressor
Option: Permitted or Blocked.
The product is initially supplied with a blocked compressor. When the compressor is blocked, the product operates like an electric boiler. All other functions are intact.
Permitted means that the compressor is allowed to operate.

Brine pump on 10 days
Option: 0 or 10 days.
After installation is complete, you can decide to run the brine pump constantly for 10 days to bleed the system.

Tariff HP
This is used when a dual tariff is used with lower energy costs at set hours of the day. The heat pump can then take advantage of reduced primary energy costs. This is set to “on" when a dual energy tariff is being used and the times programmed as necessary.

Electric heater

Boiler upper ºC **40 (30...60)**
Temperature when the electric heater is activated and assists the heat pump in reaching the correct primary flow temperature. A low setting is recommended. The electric heater is also responsible for providing the house with additional heating. If the house requires a higher temperature than that selected, the control system compensates by automatically raising the temperature.

This temperature also reflects the settings chosen under DHW

Boiler upper add ºC **70 (30...70)**
The temperature of the electric boiler when the heat pump calls for assistance to reach the correct primary flow temperature, the electric heater then works up to this value after the set time delay on the mixing valve.

Boiler upper extra DHW ºC **60 (30...70)**
This means the boiler is to provide extra DHW. This setting determines whether the electric heater should help to produce extra hot water. Set the temperature of the electric unit to the desired value when the option for extra hot water is activated under the DHW menu. A lower value means that the heat pump produces the majority of hot water, not the electric heater.

Boiler upper max kW **5.5 (0...9.0)**
You set the max. permitted power for the electric heater here.

You set the maximum permitted power for the electric unit. 0 to 9.0 kW in steps of 0.3 kW.

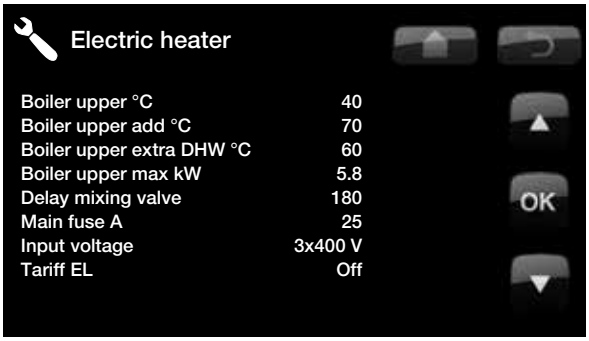
Delay mixing valve **180 (30...240)**
The mixing valve delay, the period before it draws energy from the electric unit, is set here. It can be set from 29 to 240 minutes. If the value is set to lower than 30 min., the mixing valve will never open to the boiler (Blocked).

Main fuse A **20.0 (10.0...35.0)**
The property's main fuse size is set here. This setting and the fitted current sensors ensure the fuses are protected when using appliances which generate temporary power peaks, for example, cookers, ovens, engine heaters etc. The product temporarily reduces power drawn where this type of equipment is being used.

Input voltage **3x400 V**
The value is set here to indicate whether the heat pump is connected at 3x400 V, 1x230 V or 3x230 V. 3x400 V and 1x230 V are valid for the UK.

Tariff EL **Off**
If you want the electric heater to use Tariff control.

The first figure is the preset factory value, while the values in brackets are the value's range.



When the product is reset to factory settings, the parameter Input voltage is reset to 3x400V by default. For 1x230V please re-set the correct value under Installer/Settings/Electric heater/.

Upper tank

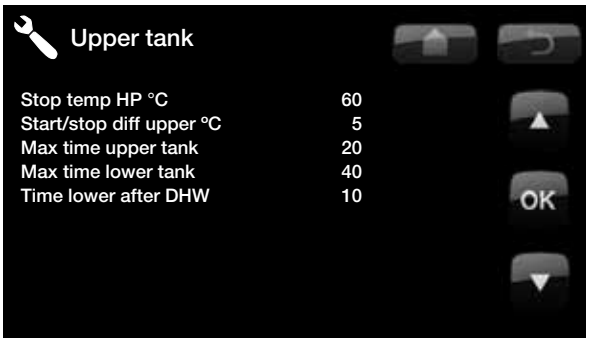
Stop temp HP °C **58 (40...60)**
At this temperature the heat pump starts charging towards the upper tank. The heat pump will charge the upper tank at temperatures above 60 °C.

Start/stop diff upper ºC **5 (3...10)**
Hysteresis before the heat pump starts or stops the charging of the upper tank.

Max time upper tank **20 (5...60)**
This is the maximum time that the heat pump charges the upper tank, if there is a need in the lower tank.

Max time lower tank **40 (10...120)**
This is the maximum time that the heat pump charges the lower tank if there is a need in the upper tank.

Time lower after DHW **10 (0...15)**
When the lower tank is being charged and there is a demand for DHW, the diverting valve switches to the upper tank to charge DHW instantly. EcoHeat 300 will resume lower tank charging after the set point in the upper tank is reached to compensate the energy loss in the house during DHW charging (0-15 minutes).

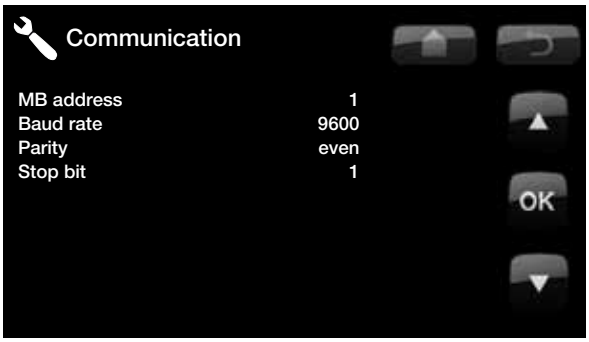

Upper tank
Stop temp HP °C 60
Start/stop diff upper ºC 5
Max time upper tank 20
Max time lower tank 40
Time lower after DHW 10
OK

Remote control

Shows the type of remote control selected.
NR=remote night reduction, e.g. mini-call system.
SO=ripple control. Not used in the UK at present.
Disconnecting the compress and electric heater during a certain period which is defined by the electrical supplier (special equipment).
DHW= Extra hot water, used along with the Extra DHW button.

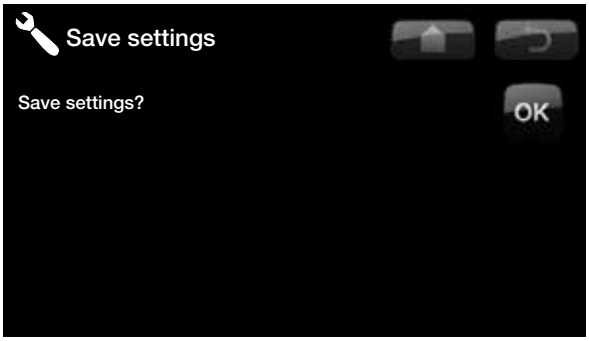
Communication

These settings are activated for the Superior systems and are not used in normal operation. They are not described in these instructions.



Save settings

Save settings. You can set your own parameters here. Press OK to confirm.



Load settings

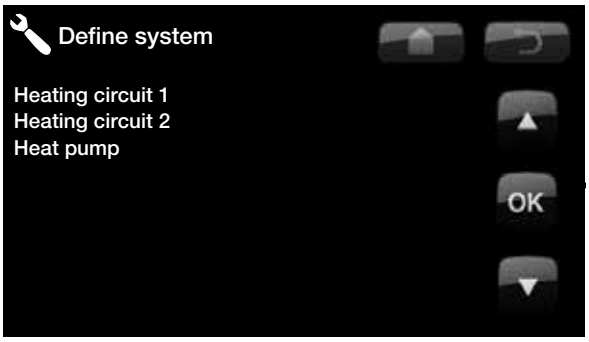
Load settings The saved settings can be reloaded using this option.

Get factory settings

Get factory setting The product is supplied with the factory values set. They can be restored by activating this function. Press OK to confirm. However, the language, product and product size are retained.

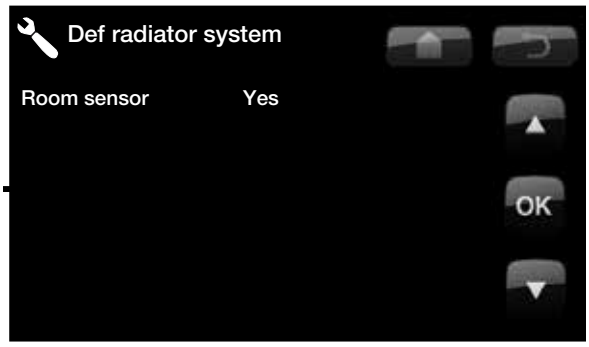
4.5.3 Define system

You can use this option to define your heating system, how the radiator systems are controlled, with or without a room sensor. The heat pump's flow switch is defined.



Def radiator system 1 or 2

This defines whether a room sensor is installed or not.



Def Heat pump

Specify whether or which type of level switch is installed in the system.

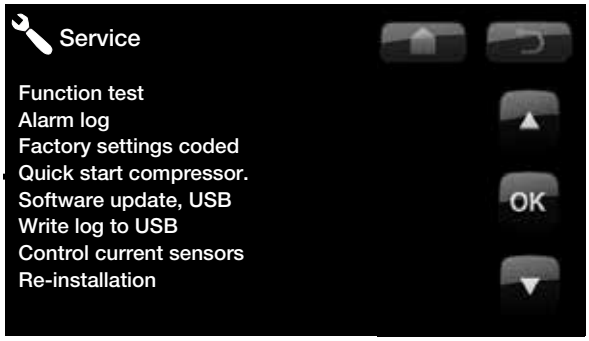
Choose between:

- None
- NC (Normally Closed)
- NO (Normally Open).

4.5.4 Service

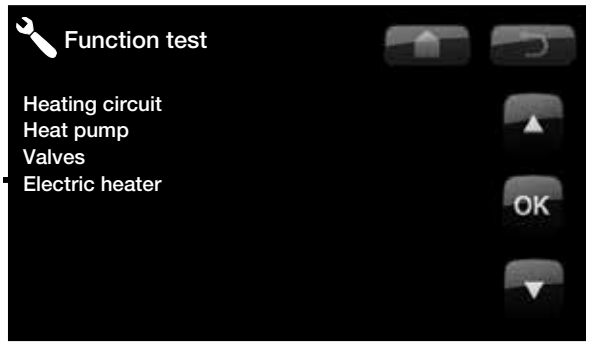
Note! This menu is only for the installer to use.

Warning! The single phase compressor must not be quick started unless you wait 5 minutes from the power up, or at least 5 minutes from last compressor stop.



Function test

This menu is intended to test the function of the various components in the product. When the menu is activated, all the product's functions stop. Each component can then be tested separately or together. All control functions are shut off. The only protection against incorrect operation are pressure sensors and the electric heater's superheat protection. When you exit the menu, the heat pump returns to normal operation. If no button is pressed for 10 minutes, the product automatically returns to normal operation.
The exception is if only the brine pump is started. It can be operated for long periods of time. It is used together with the external filling pump during installation.



When you exit the menu, the heat pump returns to normal operation.

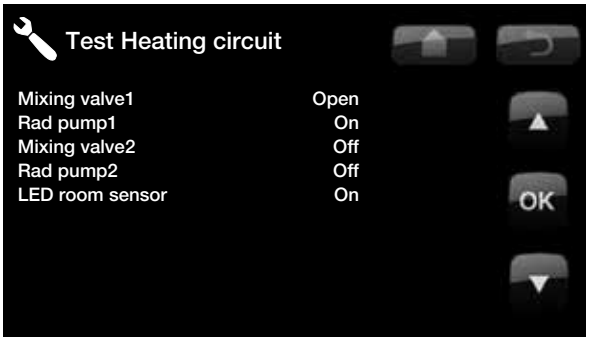
Test Heating circuit

If two heating circuits are installed, the values for both are displayed here.

Mixing valve
Opens and closes the mixing valve.

Rad pump
Starts and stops the radiator pump.

LED room sensor
The room sensor alarm function can be controlled from here. When activated, the room sensor's red LED comes on steady.



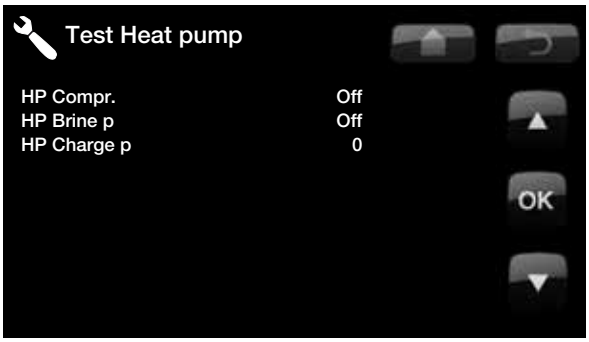
Test Heat pump

Function test Heat pump.

HP Compr.
Compressor On/Off. This is where the function test is carried out on the compressor. The brine and charge pump are also operating so that the compressor is not going to trigger its pressure switches.

HP Brine p.
Brine pump On/Off.

Hp Charge p
Charge pump On/Off. Function test 0-100 %.



Test valves

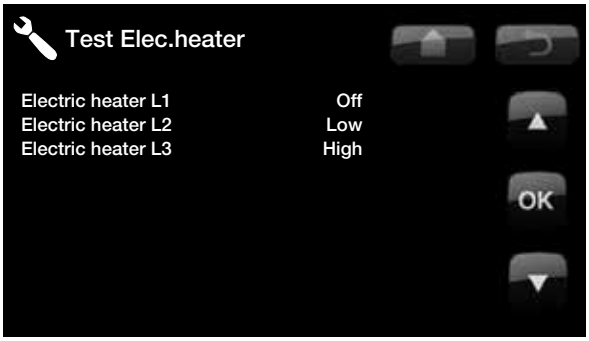
Function test carried out on the flow conditioner. This involves testing the flow Up or Down (upper and lower parts of the tank respectively).

Test Electric heater

You use this function to test the electric heater's various phases L1, L2 and L3.

The modes available are Off/Low/High/Low+High.

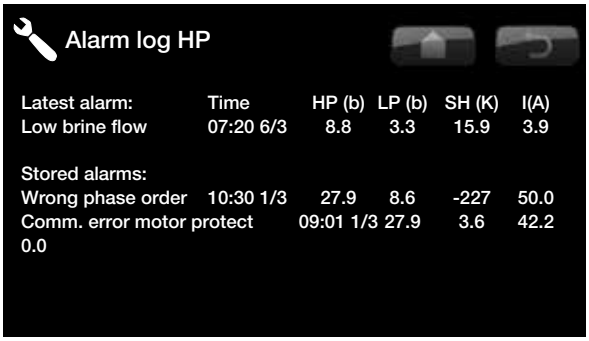
This only applies to three-phase products.



Alarm log HP

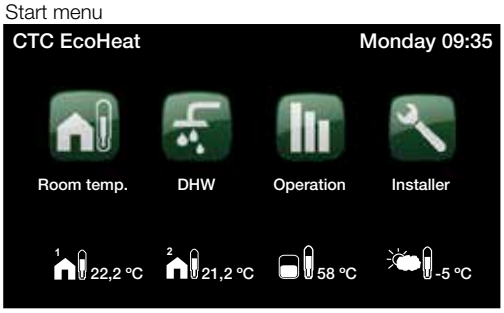
You can use this to read information about the latest alarms. The latest alarm is displayed at the top and the four latest alarms are shown under Stored alarms.

An alarm which reoccurs within an hour is ignored so as not to fill up the log. If all the alarms are the same, this can indicate that there is an intermittent fault, e.g. a loose contact.

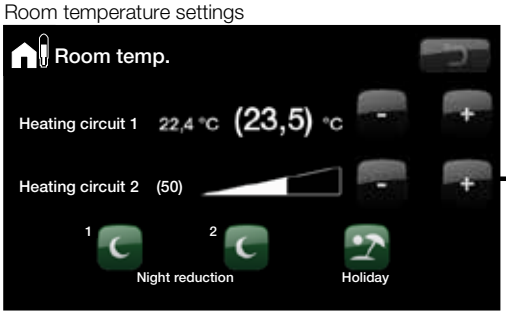

Alarm log HP
Latest alarm: Time HP (b) LP (b) SH (K) I(A)
Low brine flow 07:20 6/3 8.8 3.3 15.9 3.9
Stored alarms:
Wrong phase order 10:30 1/3 27.9 8.6 -227 50.0
Comm. error motor protect 09:01 1/3 27.9 3.6 42.2
0.0

5. Menu overview

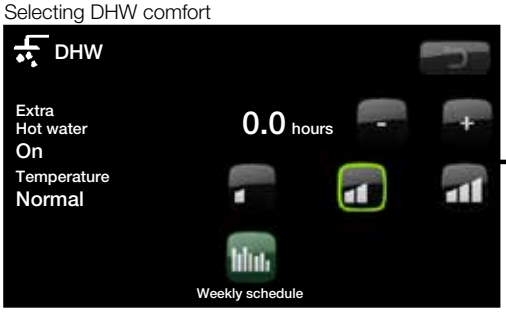
Start menu



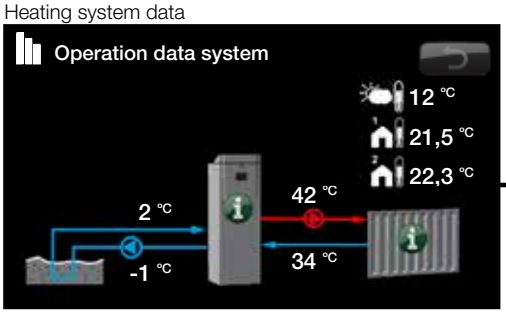
Room temperature settings



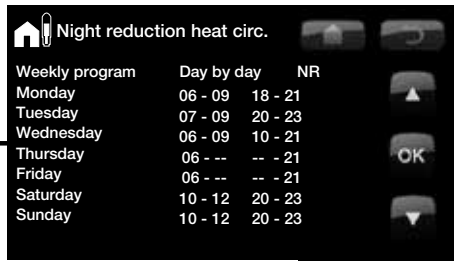
Selecting DHW comfort

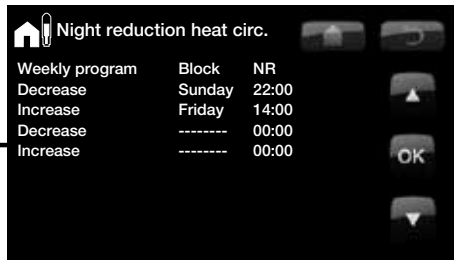


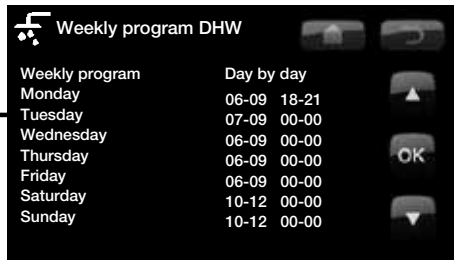
Heating system data

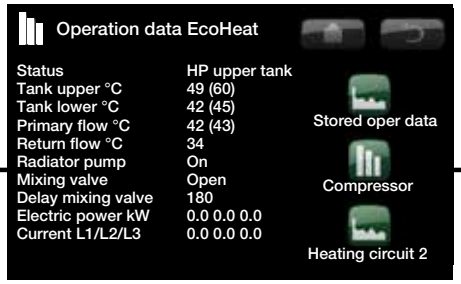


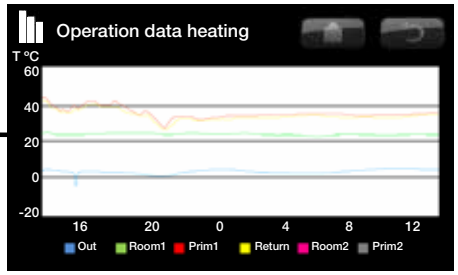
Installer settings menu

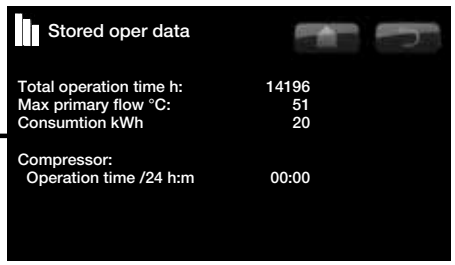

Night reduction heat circ.
Weekly program
Day by day
NR
Monday 06 - 09 18 - 21
Tuesday 07 - 09 20 - 23
Wednesday 06 - 09 10 - 21
Thursday 06 - -- -- - 21
Friday 06 - -- -- - 21
Saturday 10 - 12 20 - 23
Sunday 10 - 12 20 - 23
OK

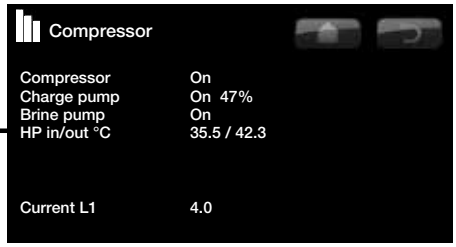






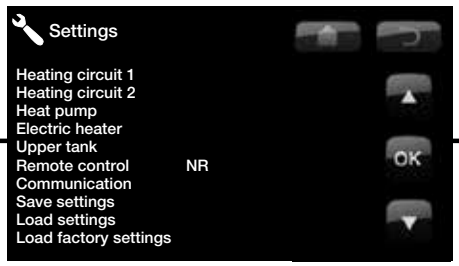


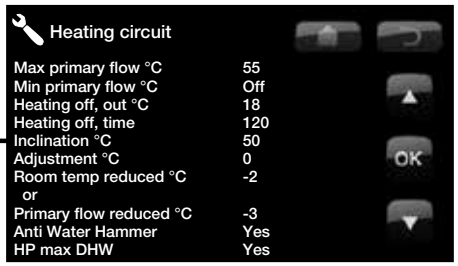

Stored oper data
Total operation time h: 14196
Max primary flow °C: 51
Consumtion kWh 20
Compressor:
Operation time /24 h:m 00:00

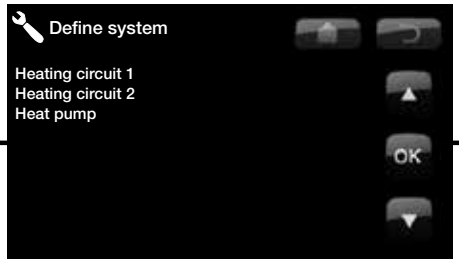

Compressor
Compressor On
Charge pump On 47%
Brine pump On
HP in/out °C 35.5 / 42.3
Current L1 4.0

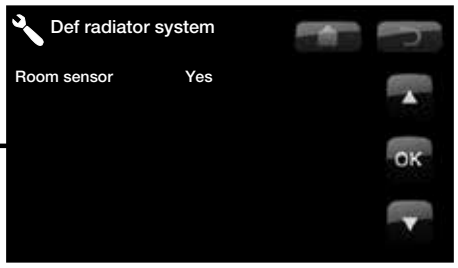
Installer
Time 21:34
Date 2012-02-05
OK

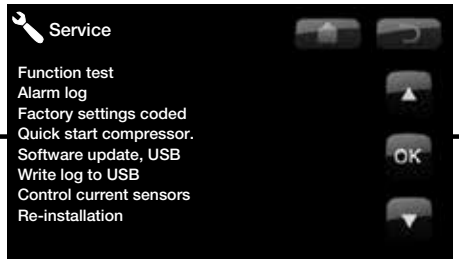
Installer
Svenska
Nederlands
English
Deutsch
Suomi
Française
Dansk
Norsk

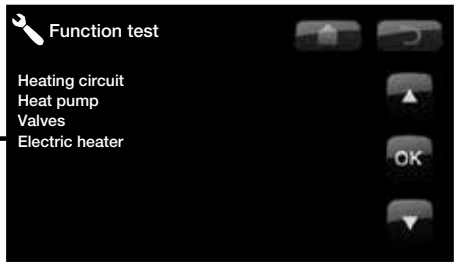

Settings
Heating circuit 1
Heating circuit 2
Heat pump
Electric heater
Upper tank
Remote control NR
Communication
Save settings
Load settings
Load factory settings
OK


Heating circuit
Max primary flow °C 55
Min primary flow °C Off
Heating off, out °C 18
Heating off, time 120
Inclination °C 50
Adjustment °C 0
Room temp reduced °C -2
or
Primary flow reduced °C -3
Anti Water Hammer Yes
HP max DHW Yes
OK


Define system
Heating circuit 1
Heating circuit 2
Heat pump
OK


Def radiator system
Room sensor Yes
OK

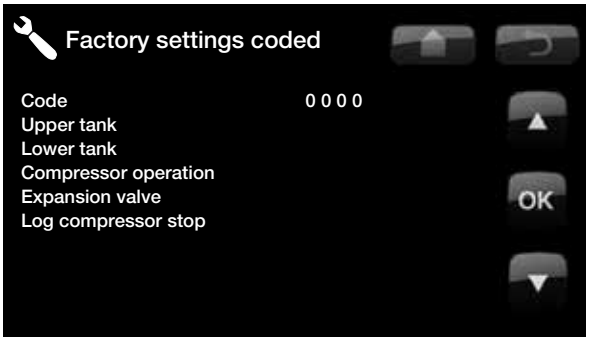

Service
Function test
Alarm log
Factory settings coded
Quick start compressor.
Software update, USB
Write log to USB
Control current sensors
Re-installation
OK


Function test
Heating circuit
Heat pump
Valves
Electric heater
OK

Factory settings coded

Note! Only an authorised service engineer is allowed to log in to the Factory settings coded option. Severe operational problems and faults may occur affecting the product if values are amended without authorisation. Note that in such cases the warranty terms do not apply.

This menu is intended to set the manufacturer's operational and alarm limits. A 4-digit code must be specified to be able to amend these limits. However, you can also take a look without any code to see what options feature in the menu.



Quick start compressor

When starting up the product, the compressor's start is delayed by 10 minutes. This function speeds up this process.

Warning! The single phase compressor must not be quick started unless you wait 5 minutes from the power up, or at least 5 minutes from last compressor stop.

Software update, USB

This is only for service engineers. This option can be used to update the software in the display via USB. The software update process is complete when the Start menu appears.

Note! The power to the product must not be interrupted, under any circumstances, during the update process.

Write log to USB

This is only for service engineers. This function can be used to save logged values to a USB memory stick.

Control current sensors

This is to be used to identify which current sensor is connected to the relevant phase.
All three currents (L1, L2 and L3) will appear in the current operational data when EcoHeat 300 has identified the current transformers' relevant phases.

In this situation it is important that you have switched off any major consumers of electricity. Also make sure that the backup thermostat is turned off.

Re-installation

This command re-launches the installation sequence. See the chapter on First start.

6. Operation and Maintenance

When the installer has installed your new heat pump, you should check along with the installer that the system is in perfect operating condition. Let the installer show you where the switches, controls and fuses are so that you know how the system works and how it should be maintained. Bleed the radiators after around three days of operation and top up with water if required.

Boiler and radiator system safety valve

Check around four times a year that the valve is working by manually turning the control. Check that water is coming out of the safety valve discharge.

Mixing Valve

The mixing valve is operated automatically from the control system, ensuring that the radiators reach the correct temperature, no matter what season it is. However, where a fault occurs, you can operate the valve by pulling out the knob on the motor and turning it clockwise to reduce the temperature or anticlockwise to increase it.

! Do not forget to reset the mixing valve to automatic position.

Draining the tank

The heat pump should be disconnected from the power source when it is being drained. The drainage valve is positioned at the bottom left of the unit when viewed from the front, behind the front of the heat pump. When draining the whole system, the mixing valve should be fully open, i.e. turned anticlockwise as far as it will go. Air must be supplied to the closed system.

Operation stop

The heat pump is shut down using the operating switch. If there is a risk of the water freezing, all the water should be drained from the heat pump and the radiator system. The DHW circuit, which contains around five litres, is emptied by inserting a hose at the bottom of the cold water connection and then siphoning it off.

7. Fault Tracing/ Appropriate Measures

EcoHeat is designed to provide reliable operation and high levels of comfort, as well as have a long service life. Various tips are given below which may be helpful and guide you in the event of an operational malfunction.
If a fault occurs, you should always contact the installer who installed your unit. If the installer believes the malfunction is due to a materials or design fault, then they will contact us to check and rectify the issue. Always provide the product's serial number.

DHW

Many want to gain maximum benefit from the heat pump's low operating costs. The control system offers three hot water comfort levels. We recommend starting at the lowest level and if there is not enough hot water, increase it to the next level. We also recommend that you operate a regular DHW check to L8 guidelines. Check that a faulty blender valve or a shower mixer is not affecting the DHW's temperature.

! Avoid running hot water at high speeds. Reducing the DHW flow will increase the temperature of the water.

The Heating System

A room sensor, which should be fitted when possible, ensures that the temperature in the room is always suitable and stable. For the sensor to provide the correct signals to the control unit, radiator thermostats should always be fully open in the area where the room sensor is located.
A correctly operating heating system is of significant importance to the heat pump's operation and affects energy savings.
Always adjust the system with all radiator thermostats fully open. The thermostats can be individually adjusted after a few days in the other rooms.

! Avoid placing the room sensor close to the stairway due to the uneven air circulation.

If you do not achieve the set room temperature, check:

- that the radiator system is correctly adjusted and is functioning normally. that radiator thermostats are open and the radiators are equally warm all over. Touch the entire radiator surface. Bleed the radiators. The heat pump's economical operation requires that the radiator system functions well, if you are to make good savings.
- that the heat pump is operating and no error messages are displayed.
- that there is sufficient electrical power available. Increase if necessary. Also check that the electric power output is not limited due to excessively high electricity loads in the property (load monitor).
- that the product is not set to the "Max. allowed primary flow temperature" mode with a too low value.
- that "Primary flow temperature at –15 °C outdoor temperature" is set sufficiently high. Increase if necessary. More can be read about this in the chapter on The house heating curve. However, always check the other points first.
- that the temperature set back is not maladjusted. See Settings/Radiator system.
- that the mixing valve is not in the manual position.

! If you do not have radiator thermostats on the upper floor, you may need to install them.

If the heat is not even, check

- that the placement of the room sensors is appropriate for the house.
- that the radiator thermostats don't interfere with the room sensor.
- that no other heat sources/cold sources interfere with the room sensor.
- that the mixing valve is not in manual mode.

Current Monitor

EcoHeat has an integrated current monitor. If the system is fitted with a current sensor (accessory for 230V 1N~), the property's main fuses are continuously monitored to ensure they are not overloaded. If the fuses are overloaded, the heat pump will automatically reduce its power output to prevent overloading the property's supply. The heat pump may be restricted where high heating requirement levels are combined with, for example, single-phase engine heaters, cookers, washing machines or tumble dryers. This may result in inadequate heating or hot water temperatures. If the heat pump is limited, "High current, elpower redu (X A)" appears in text form in the display. Consult an electrician to determine whether the fuse size is correct or the three phases in the house are evenly loaded.

Ground loop

Faults can occur in the cooling unit if the ground loop has not been installed correctly, if they have not been bled sufficiently, if they contain too little antifreeze or are not designed to an adequate size. Poor or insufficient circulation can result in the heat pump triggering an alarm in the case of low evaporation. If the temperature difference between the ingoing and outgoing temperature is too large, the product triggers an alarm and "Low brine flow" is displayed. The probable cause is that there is still air in the brine circuit. Bleed thoroughly, which may in some cases take up to a day. Also check the ground loop. See also the chapter on Connecting the brine system.

Check:

- that the brine pump (right pump) speed value is not set too low. Try to increase this.

Reset the Low evaporation alarm on the display. Where a malfunction repeatedly occurs, call in a technician to investigate and rectify the fault.

If the text "Low brine temp" is displayed, the ground loop may not be large enough or there may be a fault with the sensor. Check the brine circuit temperature in the Current operation data menu. If the incoming temperature falls below –5 °C during operation, call in a technician to inspect the brine circuit.

Air Problems

If you hear a rasping sound from the heat pump, check that it is fully bled. Turn the heat pump safety valve so that any air can be evacuated. Top up with water where required, so that the correct pressure is achieved. If this noise recurs, call a technician to check the cause.

Unusual noise when shutting off DHW

In some cases, unusual noises may be produced by the cold water, pipe work and EcoHeat due to the jolts which occur when the flow is quickly interrupted. There is no fault with the product, but the noise may occur when older outlets are used. More recent outlets are often fitted with a soft-closing mechanism. If an unusual sound comes from hard-closing dishwasher and washing machines, this can be remedied using a shock arrestor. A shock arrestor can also be an alternative to soft-closing water taps.

! Do not forget that the radiators may needto be bled as well.

Motor protection

EcoHeat constantly monitors the compressor's operating current and an alarm is triggered if the compressor is using an unusually high current. When a fault occurs the message “Motor protect high current” is displayed.

The cause of the fault may be as follows:

- Phase failure or mains interruption. Check the fuses, which are the most common cause.
- Compressor overload. Call out a service engineer.
- Faulty compressor. Call out a service engineer.
- Circulation too poor between the cooling circuit and cylinder. Check the heat medium pump (left pump).
- Abnormally high temperature in the brine circuit. Call out a service engineer.

7.1 Information messages

Information messages are displayed when appropriate and are intended to inform users about various operational situations.

Start delay
The compressor is not allowed to start too quickly when it has stopped. The delay is usually 10 minutes.

Heating off, radiator sys
Shows that the product is operating in summer-time mode when only hot water is required, not heating.

Ripple control
Shows that ripple control is active. Ripple control is a device which an electricity provider can fit with the aim of disconnecting high current draw equipment requiring power for a short period of time. Not currently in use in the UK. The compressor and electrical power are blocked when ripple control is active.

High current, elpower redu (X A)
The property's main fuses are overloaded due to the fact, for instance, that several appliances requiring power are being used simultaneously. The product reduces the electric heaters' electrical output over time.

Tariff, HP off.

Utilised when a dual tariff supply feeds the property, such as Economy 7.

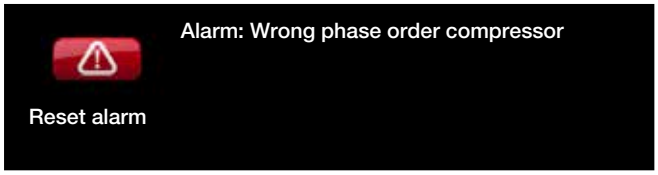
Tariff, EL, off.

Not in use.

Compressor blocked

The compressor is set to be shut down, e.g. before drilling or digging has been carried out for the collector circuits. The product comes with the compressor shut off. This option is selected under the Installer/Settings/Heat pump menu.

7.2 Alarm messages



If a fault occurs with a sensor, for instance, an alarm is triggered. A message appears on the display informing about the fault.

You reset the alarm by pressing the Reset alarm button on the display. If several alarms are triggered, they are displayed one after the other. An outstanding fault cannot be reset without being rectified first. Some alarms are reset automatically if the fault disappears.

Alarm Text	Description
Wrong phase order compressor	The product's compressor motor must rotate in the right direction. The product checks that the phases are connected correctly; otherwise, an alarm is triggered. In this case, two of the phases to the product need to be changed. The power supply to the system must be shut off when rectifying this fault. This fault generally only occurs during installation.
Alarm sensor	An alarm is displayed if a fault occurs with a sensor that is not connected or has short-circuited and if the value is outside the sensor's range. If this sensor is significant to the system's operation, the compressor stops. In this case, the alarm is reset manually after the fault has been rectified. The alarm is reset automatically after the fault has been rectified for the following sensors: Sensor upper tank (77), Sensor lower tank (75), Sensor prim flow 1 (79), Sensor prim flow 2 (80), Sensor out (83), Room sensor 1 (84), Room sensor 2 (86), Sensor brine out, Sensor brine in, Sensor HPin, Sensor HPout, Sensor discharge, Sensor suction gas, Sensor high pressure, Sensor low pressure.
Motor protect compressor	High/low current has been detected for the compressor. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
High pressure switch	The refrigerant's high pressure switch has been triggered. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
Low brine temp	Incoming brine temperatures from borehole/ground circuits are too low. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer to check the dimensions of the cold side.
High brine temp	Incoming brine temperatures from borehole/ground circuits are too high. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer to check the heat source. Excessively high brine circuit temperatures over a long period can damage the compressor.
Low brine flow	Low brine flow is very often due to air in the collector system, particularly just after installation. Collectors which are too long can also be a cause. Check also that the brine pump is set to speed 3. Press reset and check whether the alarm recurs. Also check the brine filter that has been installed. If the fault recurs, contact your installer.

Alarm Text	Description
Max thermostat	If the heat pump has been stored in an extremely cold place, the max thermostat may have been triggered. You reset it by pressing in the button on the electrical switchboard behind the front panel. Always check that the max thermostat may have been triggered.
Communication error PCB, Communication error HP, Communication error motor protect	This message appears when the display card cannot communicate with the PCB. This message appears when the display card cannot communicate with the HP control card. This message appears when the HP control card cannot communicate with motor protection.
Fuses	This message appears when the fuse has been triggered.
High compr.temp	This message appears when the compressor temperature is high. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
Low evaporation	This message appears when the evaporation temperature is low. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
High evaporation	This message appears when the evaporation temperature is high. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
Low suct gas exp. valve	This message appears when the suction gas temperature is low. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
Low evapor exp. valve	This message appears when the expansion valve's evaporation temperature is low. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
High evapor exp. valve	This message appears when the expansion valve's evaporation temperature is high. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
Low superheat exp. valve	This message appears when the expansion valve's superheat temperature is low. Press reset and check whether the alarm recurs. If the fault recurs, contact your installer.
EVO off	This message appears when there is a fault with the expansion valve control.
Phase missing	This message appears in the event of a phase failure.
Compressor type?	This message appears if there is no information about the compressor type.
Heat pump alarm	This message appears if the heat pump is in alarm mode.

8. Installation

This chapter is aimed at anyone responsible for one or more of the installations required to ensure that the product works the way the property owner wants.

Take your time going through functions and settings with the property owner and answer any questions. Both you and the heat pump benefit from a user who has completely understood how the system operates and should be maintained.

! The product must be transported and stored in a standing position.

8.1 Transportation

Transport the unit to the installation site before removing the packaging. Handle the product in the following manner:

- Forklift
- Lifting eye that has been fitted to the lifting sleeve on top of EcoHeat. An extra sleeve can be found in the middle, under the insulation.
- Lifting band around the pallet. **Note!** Can only be used with the packaging on.

Remember that the heat pump has a high centre of gravity and should be handled with caution.

8.2 Unpacking

Unpack the heat pump when it is placed next to its installation site. Check that the product has not been damaged in transit. Report any transport damage to the supplier. Also check that the delivery is complete according to the list below.

! As the cooling module is removable, there must be a free space of at least one metre in front of the product and it must not be placed below floor level either.

Standard delivery

- CTC EcoHeat 400 heat pump
- Connection pipe for cold side
- Brine filling kit
- Kit bag containing:
  - room sensor
  - primary flow sensor
  - return flow sensor
  - outdoor sensor
  - installation and maintenance manual
  - safety valve for domestic water, 9 bar
  - safety valve for cold side, 3 bar
  - 2 x cable ties
  - 3 x support sleeves
  - 2 x clamping ring connections
  - brine- level vessel
  - 3 x current sensors (This only applies to three-phase products)

9. Pipe installation

The installation must be carried out in accordance with current standards and regulations, see BS EN6700 and building regulations. The product must be connected to an expansion vessel in an open or closed system in accordance with vented and unvented regulations (G3 or G4 in 2011 amendments). **Do not forget to flush the radiator system clean before connection.** Apply all the installation settings based on the description in the chapter on First start.

The heat pump operates with a max primary flow/return temperature across the condenser of up to 65/58 °C going towards the lower tank.

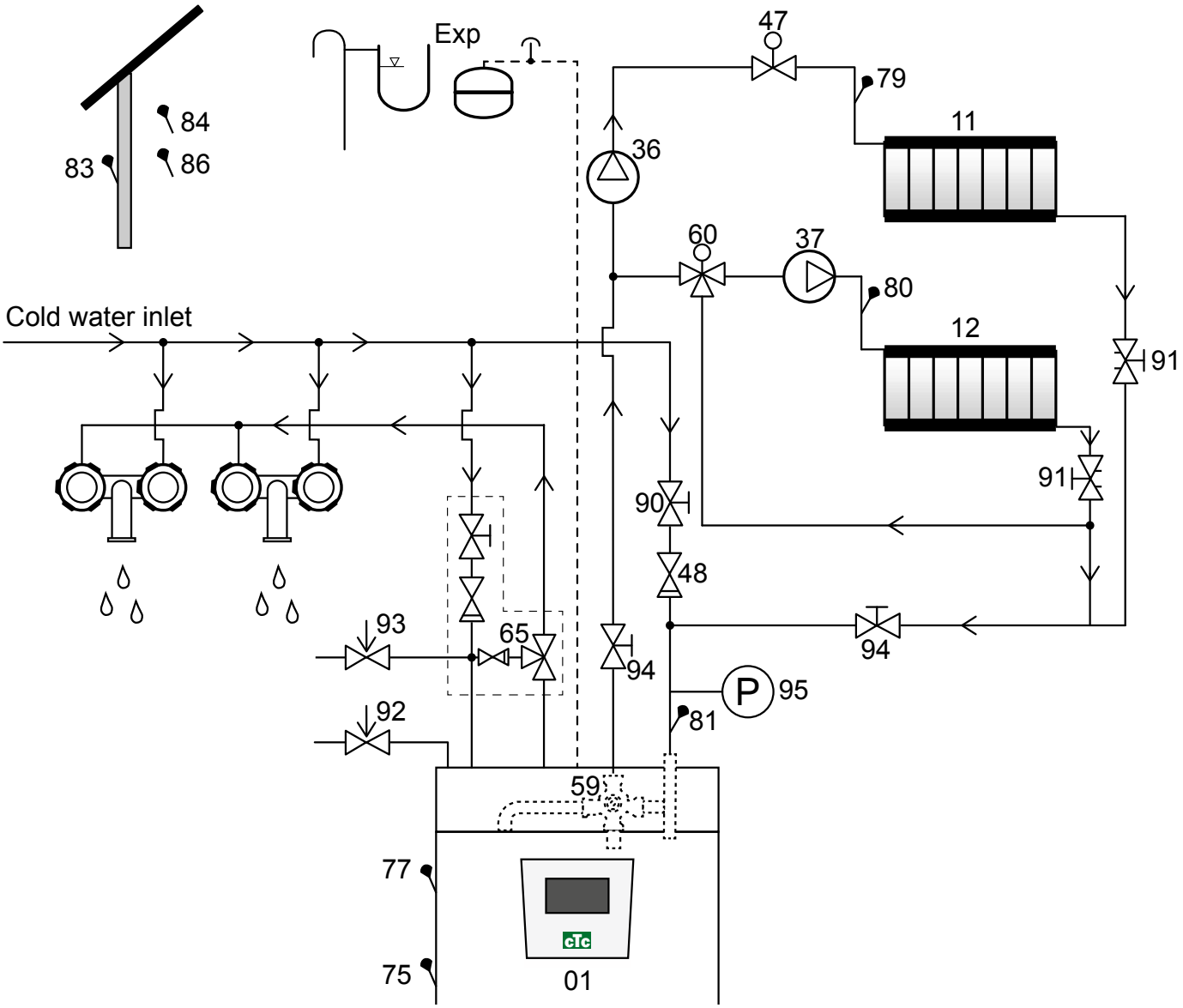
When the heat pump operates going towards the upper tank, the primary flow can reach up to 70 °C from the condenser.

9.1 Filling

The filling valve (no. 90, see schematic diagram on next page) is connected to the radiator return pipe. Alternatively, the valve can be installed in the direction of the expansion pipe. When filling the system, the mixing valve (59) must be wide open. Pull out the knob on the valve and turn it anticlockwise as far as you can. Do not forget to push in the valve's knob in automated mode.

9.2 Schematic diagram

This shows the main connection between the heat pump and the property's radiator and hot water system. Different installations and systems may look different, such as a one- or two-pipe system, which means that the finished installation may be different. To find out about connecting the cold side, see the chapter on Connecting the brine system.



01	CTC EcoHeat 400	79	Primary flow sensor for radiator system 1
11	Radiator system 1	80	Primary flow sensor for radiator system 2
12	Radiator system 2	81	Sensor, radiator return
36	Circulation pump, radiator system 1	83	Outdoor sensors
37	Circulation pump, radiator system 2	84	Room sensor 1
47	Electric shut-off valve for radiator system	86	Room sensor 2
48	Non-return valve for incoming cold water	90	Filling valve – radiator system
59	Mixing valve for bivalent radiator system	91	Adjustment valves for radiator coils
60	Mixing valve for radiator system 2	92	Safety valve for boiler (fitted in factory)
65	Mixing valve for DHW	93	Safety valve for DHW
75	Sensor lower tank	94	Shut-off valve
77	Sensor upper tank	95	System/boiler pressure installed on return pipe

Circulation pump for radiator system (36) (37)

The circulation pump is fitted on the heat pump's primary flow and must be connected electrically from the boiler, see chapter on Electrical installation.

Mixing valve DHW (65)

Install a mixing valve for the hot tap water in order to avoid the risk of scalding.

Safety valve DHW (93)

Fit the enclosed valve to the incoming cold water connection. Connect the waste pipe to the waste system through the waste funnel. The waste pipe must slope towards the waste system, be installed frost-free and left open to the atmosphere/without pressure.

> ! Note! The waste pipe must be fitted to the waste system.

Non-return valve (48)

Fit the non-return valve to the incoming cold water connection.

Shut-off valve (94)

It is important to fit a shut-off valve (94) on both the radiator's primary flow and return pipe.

> ! NB! It is important to fit a shut-off valve (94) on both the heat pump's primary flow and the radiator's return pipe.

Boiler safety valve (92)

The boiler's safety valve is fitted in the factory on the left side of the top. Connect the waste pipe to the waste system directly through the waste funnel. The waste pipe must slope towards the waste system, be installed frost-free and left open to the atmosphere/without pressure.

Filling valve for radiator system (90)

Fit a filling valve between the cold water connection and the radiator return pipe, or between the cold water pipe and the expansion pipe.

Manometer system pressure (95)

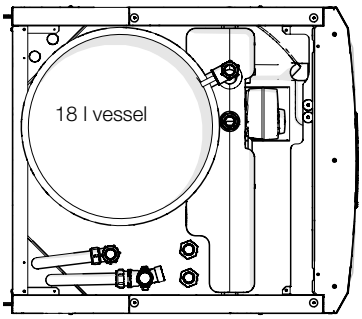
Fit the manometer on the expansion pipe or radiator return pipe.

Expansion vessel connection

The EcoHeat must be connected to a closed expansion vessel. The heat pump is ready to be fitted to an 18 l closed expansion vessel, positioned compactly on top of the product. The expansion vessel with the required angle connection is available as an accessory. Then connect the system manometer to the radiator return pipe.

If you choose another expansion vessel, a manometer is often included. If you use an open system, the distance between the expansion vessel and the highest placed radiator must not exceed 2.5 m in order to avoid introducing oxygen into the system.

Note that no hot water circulation may be connected as it affects the function of the heat pump and the system. If the heat pump is connected together with another heat source, e.g. an existing boiler, the installations must have separate expansion vessels.



Top view

Operation without a brine system

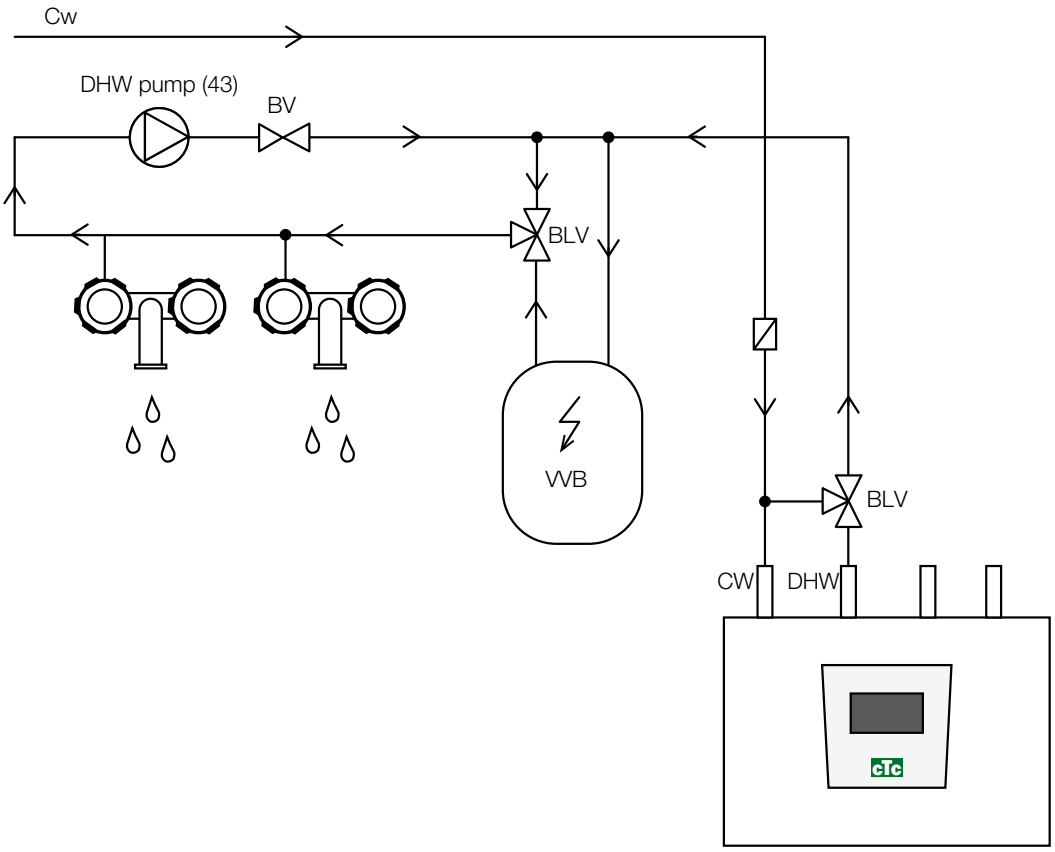
EcoHeat can be used without the brine system's cold side being connected. The heat pump then operates like a normal electric boiler with its control system providing full functionality. However, the DHW capacity is slightly lower as only the upper part of the tank is heated. Make sure that the compressor is blocked.

Water taps

In some cases, unusual noises may be produced by the house's pipe system and EcoHeat due to the jolts which occur when the flow is quickly interrupted. There is no fault with the product, but the noise may occur when older model outlets are used. More recent outlets are often fitted with a soft-closing mechanism. Alternatively, a shock arrestor can be fitted. Keeping the jolting to a minimum also helps avoid unnecessary wear and tear affecting the DHW system.

DHW system

You can connect a DHW circulation system. You can see this kind of connection in the figure below.



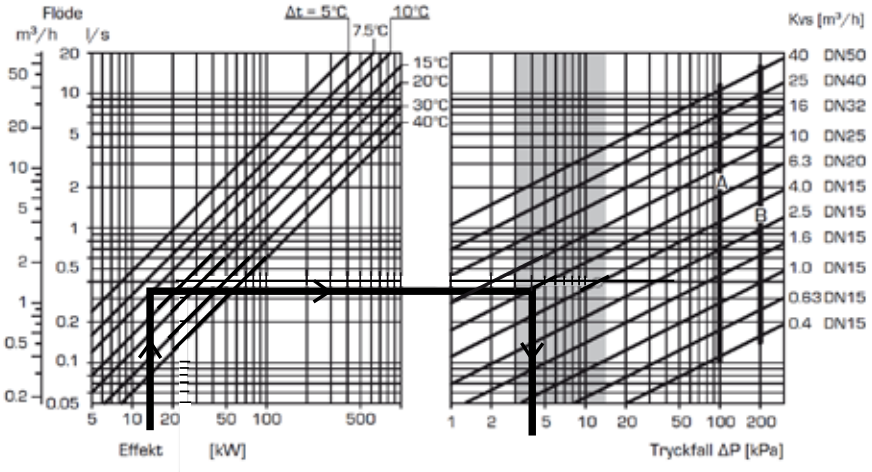
Pressure drop

Pressure drop in mixing valve

The diagram below shows a drop in pressure in the mixing valve.

Start with the heat requirement in kW (e.g. 15 kW), then move vertically to the selected Δt (e.g. 10 °C). Then move horizontally to the line for the EcoHeat mixing valve = line 6.3 DN20. The reading for the pressure drop is taken from the scale directly below (4 kPa).

For EcoHeat, see valve DN20.



10. Connecting the brine system

The brine system, i.e. the ground collector loop, must be assembled and connected by a qualified tradesman in accordance with current regulations and design guidelines.

Extreme care must be taken to ensure that no dirt gets on the collector hoses, which must be washed clean before being connected. The protective caps must remain in place at all times while work is in progress.

The temperature in the brine system can go below 0 °C. This is why it is important not to use any water-based lubricant etc. during installation. It is also important that all the components are insulated against condensation to prevent the build-up of ice.

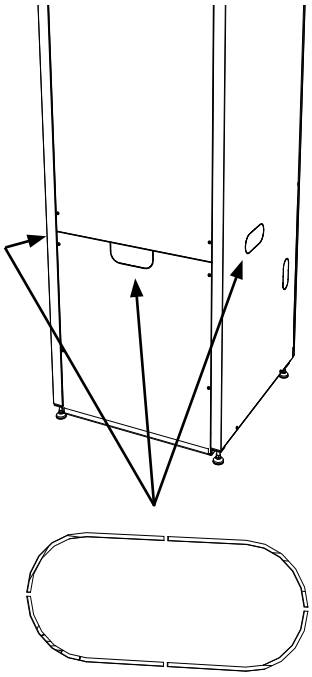
! We recommend that you follow the installation instructions from the local Heat Pump Association.

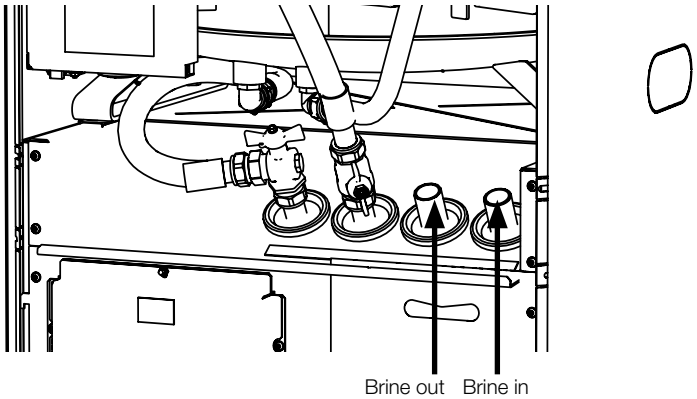
Connections

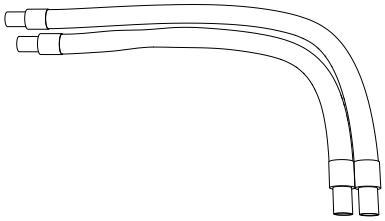
The brine system may be connected to the right, left or back of the heat pump. Cut away the cover plate on the side where the brine system is to be connected. The insulation on the inside of the cover plate has been grooved to enable an opening to be cut for the brine hoses provided. When the opening has been made through both the insulation and cover plate, carry out the installation as follows:

1. In order to protect the brine hoses, fasten the protective edging provided around the edge of the opening in the insulation plate. Adjust the length of the protective edging to suit the opening as required.
2. Attach the provided compression couplers to the cooling module connector pipes. To facilitate attachment, the upper brine pump connection may be loosened and rotated if necessary.
3. Pass the brine hoses through the opening in the side cover plates and connect them to the compression couplers. Ensure that the connections are well insulated to avoid the build-up of ice and condensation.
4. Install the collector system after this according to the schematic diagram.

You can also connect the primary flow on one side and the return on the other. See the chapter on Measurement details for measurements and dimensions. The pipe between the heat pump and collector loop should have an internal diameter of no less than Ø28 mm.







Arrange the hoses so that the longest is the outermost. This applies whether connected from the left or right.

Valves

You fit the valves as shown in the schematic diagram on the next page. To facilitate servicing of the cooling unit, shut-off valves should be fitted to both the incoming and outgoing connections. Fit bifurcated valves so that you can fill and bleed the collector circuit later on.

Bleeding

The collector circuit must not contain any air. Even the smallest amount of air can jeopardise the heat pump's operation. See the section Refilling and venting below.

Insulation against condensation

You must insulate all the pipes in the brine system against condensation. Otherwise, there will be a strong build-up of ice and condensation.

Refilling and venting

Mix water and antifreeze solution in an open vessel. Connect hoses to the shut-off valves (98a and 98b) as shown in the figure. Note! The hoses must have a minimum diameter of 3/4". Connect a powerful external pump (101) for refilling and bleeding. Then reset the three-way valve (100) and open the valves (98a and 98b) so that the brine passes through the mixing container (102). Also make sure that the valve (98d) is open.

If the heat pump is connected to the power supply, start the brine pump (103) as follows:

- Go to the menu Installer/Service/Function test.
- Select the Brine pump option and activate it. The brine pump runs until it is manually stopped.

Allow the brine to circulate in the system for a long period of time until it is completely free of air. There can still be air in the system, even though no air accompanies the liquid out. Reset the three-way valve (100) so that any remaining air can come out.
Bleed the level vessel (96) by loosening the plug on top of the level tank.
Now close the valve (98a) while the filling pump continues to run. The filling pump (101) now pressurises the system. Also close the valve (98b) and shut off the filling pump.
If the level in the level vessel is too low, close the valves (98c and 98d). Unscrew the plug and fill the vessel to around 2/3 full. Screw the plug back in and open the valves (98c and 98d).

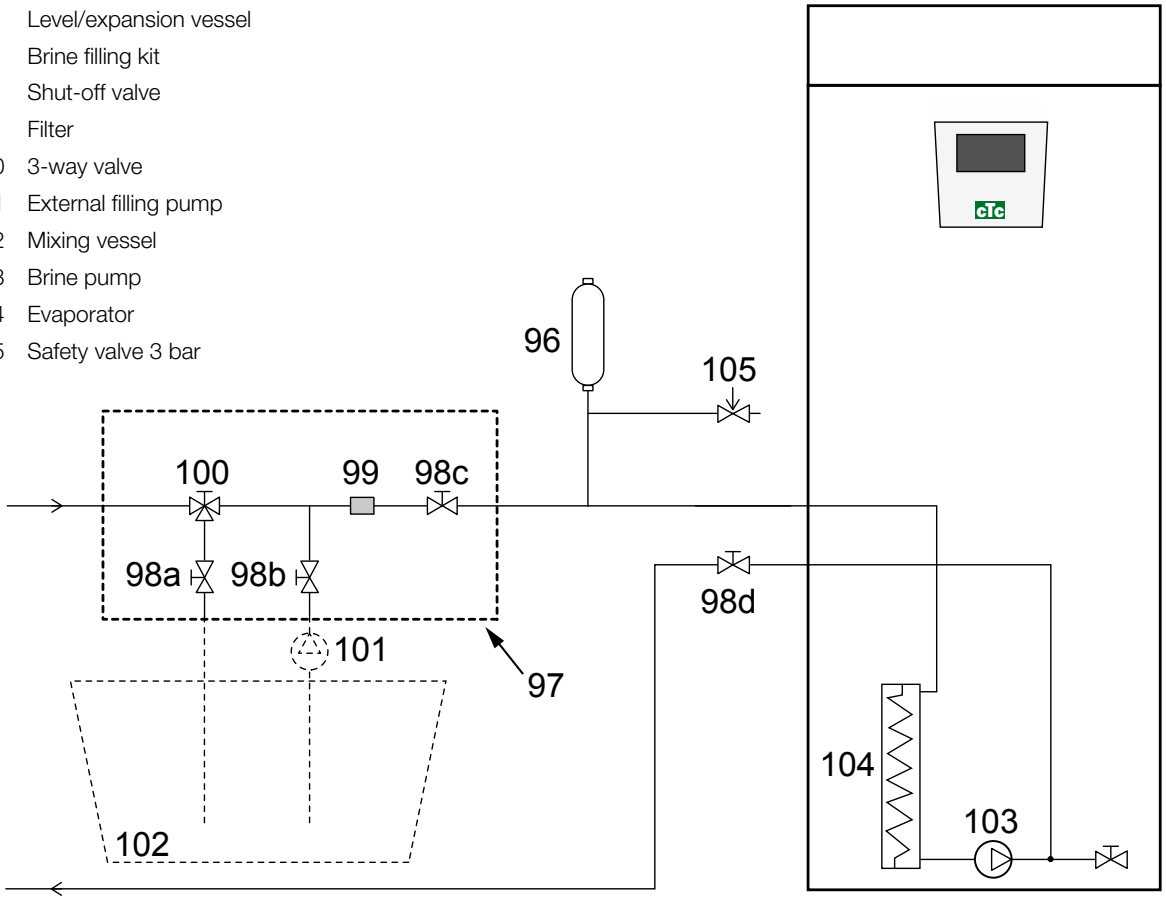
Pressure/level switch

In some cases, extra protection is required due to local requirements or provisions. For example, the requirement in some areas is for the system to be installed within a water catchment area. The pressure/level switch is connected to blocks G73 and G74 and then defined under the Installer/Define system/Def Heat pump menu. If there is a leak, the compressor and brine pump stop and the Flow/level switch alarm appears on the display.

! Use the Brine pump on 10 days function to bleed the system properly.

10.1 Brine system schematic diagram

96 Level/expansion vessel
97 Brine filling kit
98 Shut-off valve
99 Filter
100 3-way valve
101 External filling pump
102 Mixing vessel
103 Brine pump
104 Evaporator
105 Safety valve 3 bar



The diagram shows the main connection for the brine system. The filling equipment is represented by the parts displayed with dashes. Note! Collector hoses must have a bleeding facility as air pockets can occur. Always check the filter (99) when filling and bleeding the brine system.

Post-installation check on brine system

After a few days, you must check the fluid level in the vessel. Fill if necessary and close the valves (98c and 98d) when filling.

Level/expansion vessel

The level vessel should be fitted to the incoming line from the borehole or ground loop, at the system's highest point. Bear in mind that the tank can produce condensate on its exterior. Fit the safety valve (105) as shown in the schematic diagram and fit a suitable plug to the top of the vessel.

If the vessel cannot be fitted at the highest point, a closed expansion vessel can be fitted.

! The mixing vessel and pump should be a good size.

Brine filling kit with dirt filter

A filling kit for topping up, adding and filtering brine. Arrows on the valve housing indicate the flow direction. Close valves (98c and 100) when cleaning the filter. Unscrew the filter cap and flush the filter clean. When refitting, the pin under the filter holder should be fed into the designated hole in the filter housing. Top up with a little brine, if necessary, before fitting the cap. The filter should be checked and cleaned after a short period of operation.

! Check the dirt filter after bleeding has been completed.

Brine

The brine circulates in a closed system. The fluid consists of water and antifreeze solution. Sentinel R500 & R500C are recommended for use in the brine circuit on all CTC EcoHeat/Part heat pumps. The glycol is mixed at a concentration of slightly less than 30%, which is equivalent to fire risk class 2b and a freezing point of around –15 °C.

! The fluid must be thoroughly mixed before the heat pump is restarted.

It is a CTC recommendation that around 1 litre of brine/glycol is required per metre of collector hose, i.e. around 0.3 litres of antifreeze solution will be needed per metre of hose, for a hose diameter of 40 mm.

Air pockets

To avoid air pockets, make sure that the collector hoses constantly rise towards the heat pump. If this is not possible, it must be possible to bleed the system at the high points. The filling pump usually manages smaller local height discrepancies.

Checking brine difference

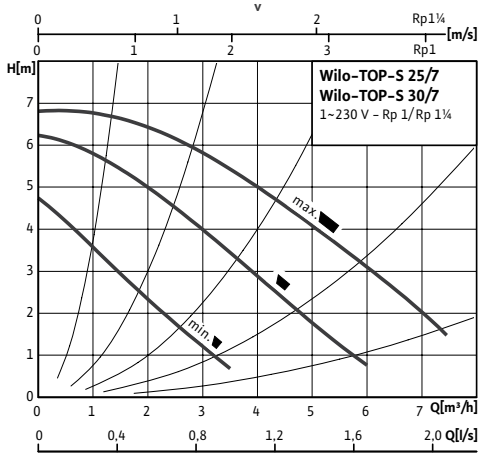
When the heat pump is running, regularly check that the temperature difference between incoming and outgoing brine temperatures is not too large. If there is a large difference, one of the causes may be due to air in the system or a blocked filter. If this is the case, the heat pump triggers the alarm.

The alarm factory setting is 7 °C, but 9 °C is permitted for the first 72 hours while the compressor is running, as microbubbles in the system can reduce brine flow.

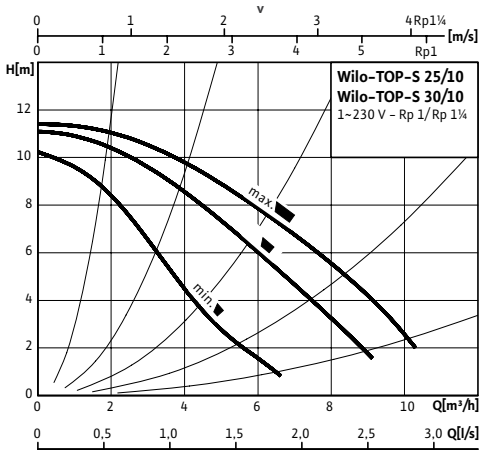
Brine pump

The brine pump has three speeds. A different speed can be set depending on the length of the brine hose being used. For example, the hose used for heat extracted from a horizontal ground loop is usually longer than for heat extracted from a borehole, which can mean a greater need for a higher speed. The brine pump's speed is set so that the difference in temperature between brine in and brine out is approx.: 3 ºC.

Pump curves TOP-S 25/7 (CTC EcoHeat 406-410)



Pump curves TOP-S 25/10 (CTC EcoHeat 412)

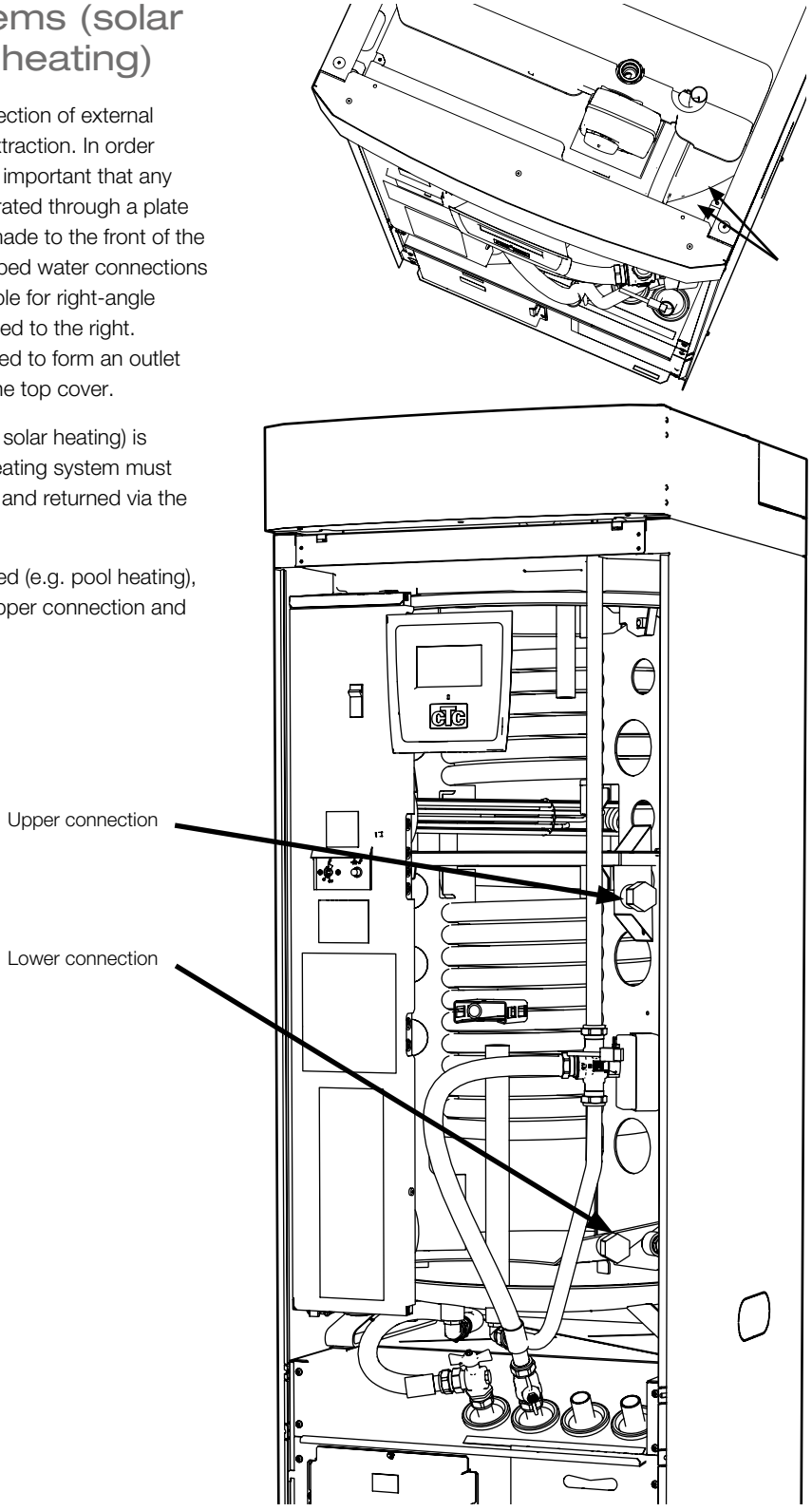


10.2 External systems (solar heating, pool heating)

The product is adapted for the connection of external systems for energy supply or heat extraction. In order to avoid damage to the product, it is important that any external system is hydraulically separated through a plate heat exchanger. The connection is made to the front of the unit behind the front panel. Two capped water connections each with 3/4" internal threads suitable for right-angle connectors (3/4" – 22 mm) are situated to the right. Insulated 22 mm copper piping is used to form an outlet through suitably made openings in the top cover.

When an energy supply system (e.g. solar heating) is connected, the water for the solar heating system must be drawn from the lower connection and returned via the upper connection.

When a heat extraction system is used (e.g. pool heating), the water must be drawn from the upper connection and returned via the lower connection.



! Connecting external systems can seriously affect the heat pump's operation and performance and can therefore produce undesirable effects if the system is not installed correctly.
If you are unsure how to make the connection, contact CTC for suggestions on how to install the system.

11. Electrical installation

The installation and heat pump connection shall be done by an authorised electrician. All wiring shall be installed according to valid requirements. The immersion heater is internally connected by the factory and set for a 5.5 kW power output. It has equal phase loading at all power steps. Electrical connections are made behind the product's front panel. Undo the screws on the top (2 screws), bend out and put the front to one side (disconnect any network cables on the front printed circuit card for easier access). The terminal boards are located behind the electrical connection box cover. Connection cables are inserted in the cable ducts on the unit's top cover, which exit at the same height as the bottom of the electrical connections box. Sensor cables are inserted separately as far as possible through the cable ducts to the right of the product's top cover.

Supply

The CTC EcoHeat 400 400V 3N~must be connected to 400V 3N~ and protective earth.
The CTC EcoHeat 400 230V 1N~must be connected to 230V 1N~ and protective earth.
The group fuse size is specified in the chapter on Technical data.

Omnipolar switch

An omnipolar safety switch should be installed.

Circulation pump connection for radiator system (36)

The radiator pump is connected electrically to the terminal board. Electrical data: 230 V 1 N~. Internal fuse 10 A.

Max thermostat

If the heat pump has been stored in an extremely cold place, the max thermostat may have been triggered. You reset it by pressing in the button on the electrical switchboard behind the front panel.
Always check that the max thermostat has not been triggered during installation.

Symbol for max thermostat:

Extra low voltage protection

The following outputs and inputs have extra low voltage protection: current transformer, outdoor sensor, room sensor, primary flow sensor, return sensor, NR/SO.

Connection for outdoor sensor (83)

The sensor should be set up on the house’s northwest or north side, so that it is not exposed to morning and evening sun. If there is a risk of the sensor being affected by the sun's rays, it must be protected by a screen.

Place the sensor at around 2/3 of the height of the facade near a corner, but not under a roof projection or other form of wind protection. Do not place it either above ventilation ducts, doors or windows where the sensor may be affected by factors other than the actual outdoor temperature.

Room sensor connection

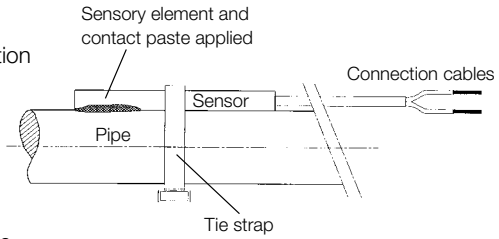
The room sensor is fitted at a central point in the house, in the most open position possible, ideally in a hall between several rooms. This is the best position for the sensor to record an average temperature for the house.

Feed a three-conductor cable (minimum 0.5 mm^2) between the heat pump and room sensor. Then attach the room sensor securely in a position at roughly two thirds of the way up the wall. Connect the cable to the room sensor and heat pump.

! Do not attach the sensor cable permanently until you have tested where the best location is.

Connecting the primary flow/return sensor

Fit the primary flow sensor to the primary flow pipe, ideally after the circulation pump. Fit the return sensor to the return pipe.
The sensor component is at the front of the sensor unit, see diagram.



- Attach the sensor using the tie strap provided.
- Ensure that the sensor has good contact with the pipe.
  If required, apply contact paste to the front of the sensor, between the sensor and pipe, if good contact is difficult to achieve.
- **Important!** Insulate the sensor using pipe insulation.
- Connect the cables to the heat pump terminal board.

Remote-controlled temperature reduction at night

The temperature night reduction function can be activated via a closed function on the electricity remote control input, pins G33 and G34 on the terminal board. The function can be controlled remotely using “Mini-call”, for instance.
While the input is short circuited, the night-time temperature reduction is activated, regardless of other temperature night reduction settings. When the short circuit ceases, the product returns to ordinary temperature night reduction operation.
The size of the reduction is set in the menu: Installer/Settings/Radiator system/ Prim reduced.

Note: the input function can be selected according to the following:

- NR = Night reduction of temperature (time-controlled lowering of temperature)
- SO = Shut off (compressor and power output blocked by the electricity supplier)
- DHW = Extra hot water button (accessory)

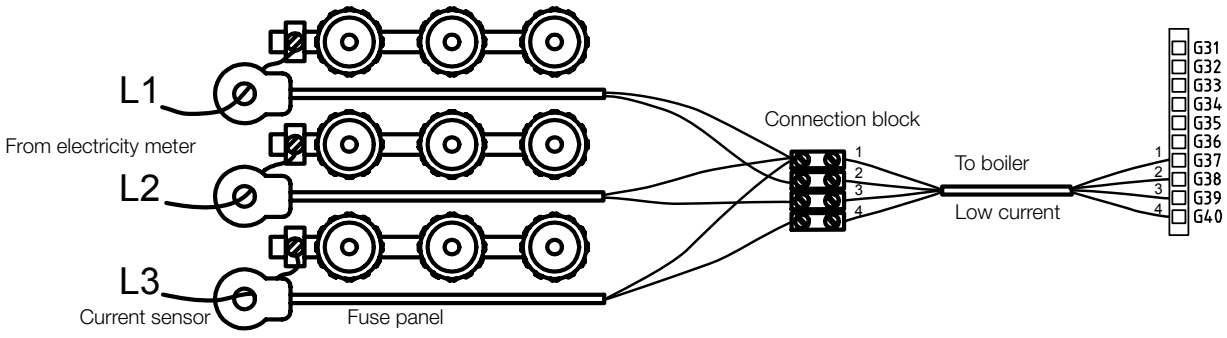
Current sensor connection

The three current sensors (designated current transformer on the connection block), one for each phase, are fitted on the fuse panel in the following manner.

Each phase from the electricity distribution board supplying the EcoHeat is channelled through a current sensor before termination at the relevant terminal. Then connect to the boiler based on the terminal board diagram. This allows the phase current to be sensed all the time and compared with the value set for the heat pump's load switch. If the current is higher, the control unit drops to a lower heat output. If it is still too high, further reduction in output takes place.

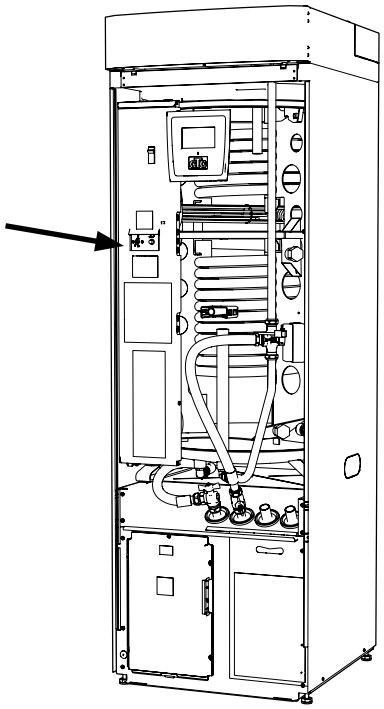
When the current has dropped below the set value again, the output will increase. This means that the current sensors, along with the electronics, prevent more power being supplied than the main fuses can tolerate.

Use at least 0.5 mm^2 cable.

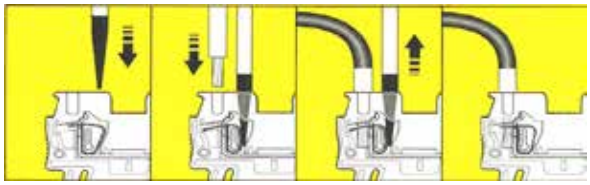


Terminal board

There is a terminal board for sensors etc. behind the panel.



> **!** Open the spring block first using a screwdriver before the cable is inserted. Otherwise, there is a risk of poor contact. Also make sure that the conductor is sufficiently stripped.



400V 3N~

G 11 G 12		Utegivare / Outdoor sensor	Klenspänning / Low voltage
G 13 G 14		Framledningsgivare 1 / Primary flow sensor 1	
G 15 G 16		Framledningsgivare 2 / Primary flow sensor 2	
G 17 G 18 G 19	RG-1 RG-2 RG-4	Rumsgivare 1 / Indoor sensor 1	
G 20 G 21 G 22	RG-1 RG-2 RG-4	Rumsgivare 2 / Indoor sensor 2	
G 31 G 32		Returgivare / Return flow sensor	
G 33 G 34		Fjärr- / Rundstyrning Night temp / Ext control	
G 37 G 38 G 39 G 40	Gemensam/Common L1 L2 L3	Strömkännare / Current sensor	
A 15 A 16 A 17	Svart öppna / Black open Brun stäng / Brown close Blå / Blue	Shunt 2 / Mixing Valve 2	230V 1N~
A 31 A 33 PE	L1 N PE	Radiator pump 1	
A 36 A 34 PE	L1 N PE	Radiator pump 2	
L1 L2 L3 N PE		Matning / Power supply	400V 3N~

230V 1N~

G 11 G 12		Utegivare / Outdoor sensor	Klenspänning / Low voltage
G 13 G 14		Framledningsgivare 1 / Primary flow sensor 1	
G 15 G 16		Framledningsgivare 2 / Primary flow sensor 2	
G 17 G 18 G 19	RG-1 RG-2 RG-4	Rumsgivare 1 / Indoor sensor 1	
G 20 G 21 G 22	RG-1 RG-2 RG-4	Rumsgivare 2 / Indoor sensor 2	
G 31 G 32		Returgivare / Return flow sensor	
G 33 G 34		Fjärr- / Rundstyrning Night temp / Ext control	
G 37 G 38 G 39 G 40	Gemensam/Common L1 L2 L3	Strömkännare / Current sensor	
A 15 A 16 A 17	Svart öppna / Black open Brun stäng / Brown close Blå / Blue	Shunt 2 / Mixing Valve 2	230V 1N~
A 31 A 33 PE	L1 N PE	Radiator pump 1	
A 36 A 34 PE	L1 N PE	Radiator pump 2	
L1 N PE		Matning / Power supply	230V 1N~

11.1 Settings made by the installation electrician.

The following settings shall be made by the installation electrician after installation:

- Select main fuse size
- Select the power limitation for the immersion heater.
- Check room sensor connection
- Check that the sensors connected indicate reasonable values.

Carry out the following checks:

Main fuse and effect limitation settings

See the chapter on First start.

Check room sensor connection

- Go to the menu: Installer/Service/Function test/Radiator system.
- Go down and select the option LED room sensor and press OK.
- Select On using the + button and press OK.
  Check that the room sensor LED is on. If not, check the cables and connection.
- Select Off using the - button and press OK. If the OK LED goes off, the check is complete.
- Return to Start menu by pressing the Home button.

Check connected sensors

If any sensor is incorrectly connected, a message will appear on the display, e.g. “Alarm sensor out”. If several sensors are incorrectly connected, the different alarms are displayed on different rows.

If no alarm is displayed, the sensors are connected correctly.

The current sensor connection has no alarm, but the current value can be read in the Operation data menu. Note that the tolerance/accuracy is very low with small current values.

11.2 Installing a backup power supply

The DIP switch on the PCB is used to set the backup power supply. The DIP switch is marked “RESERV” (BACKUP).

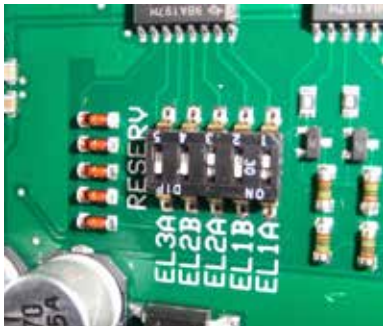
When the switch is set DOWN, the step is actively operating in backup heating mode.

400V 3N~

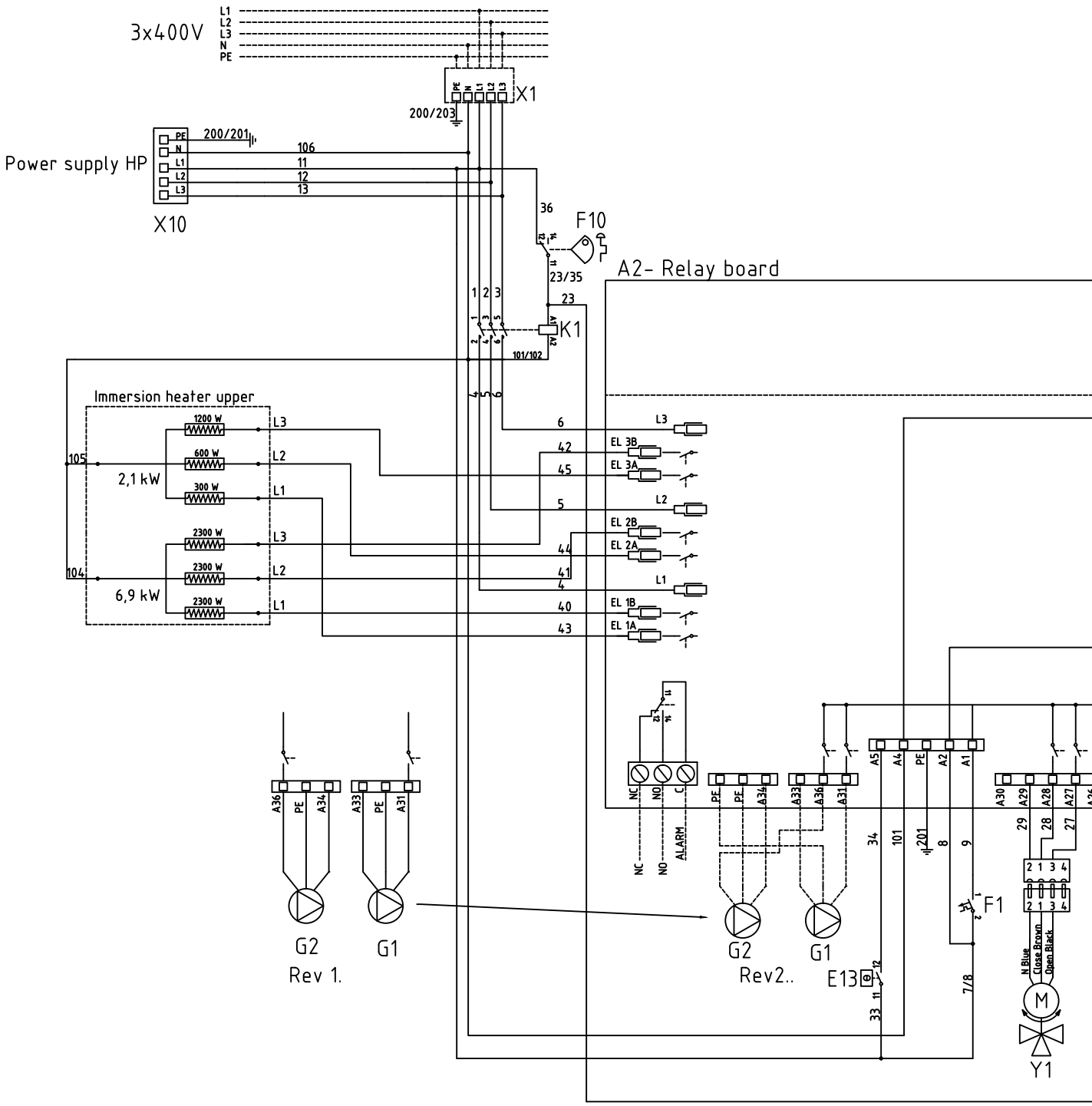
Switch	5	4	3	2	1
Phase	L3	L2	L2	L1	L1
Current	10 A	10 A	2.6 A	10 A	1.3 A
Power	2.3 kW	2.3 kW	0.6 kW	2.3 kW	0.3 kW

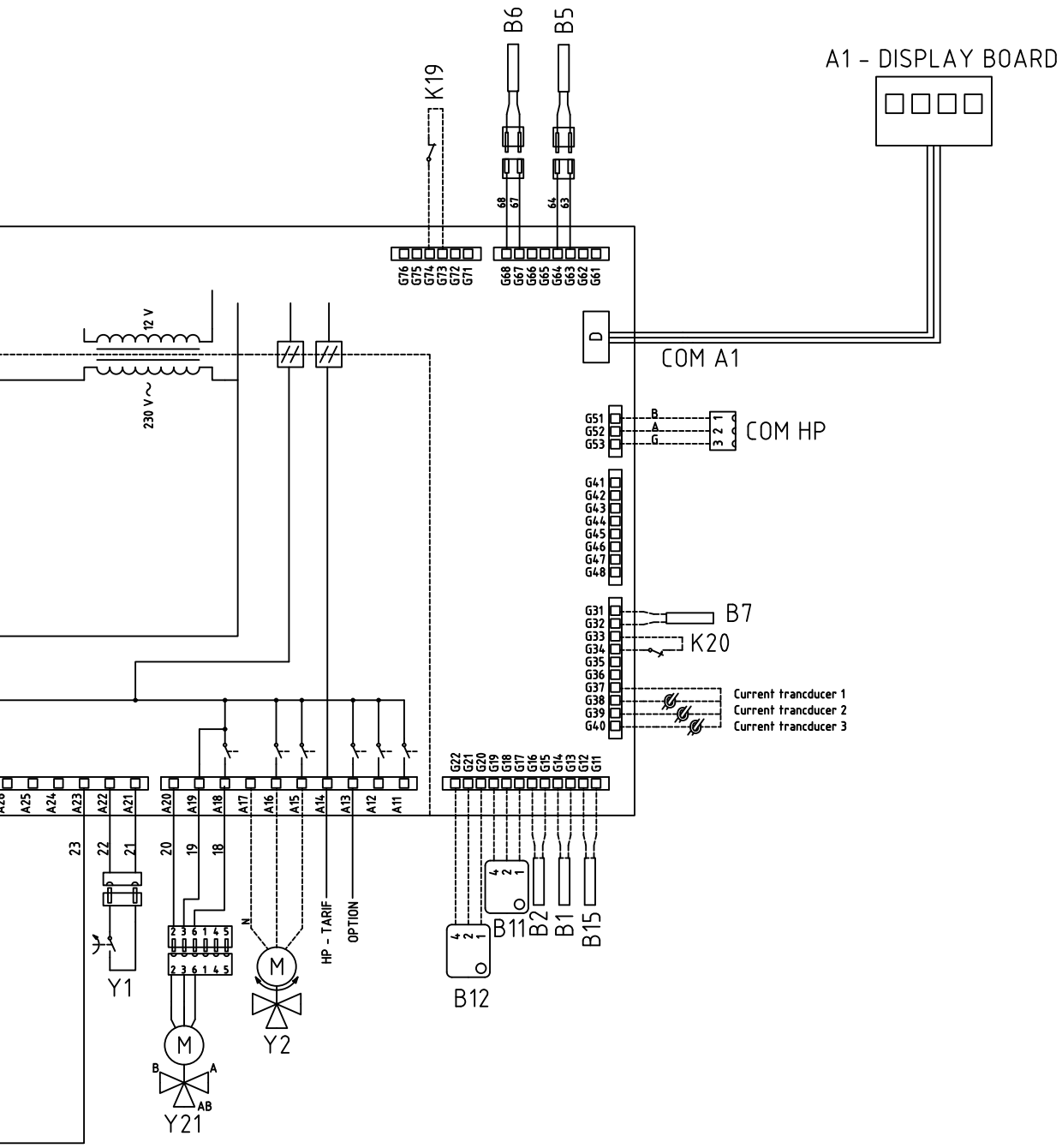
230V 1N~

Switch	5	4	3	2	1
Phase	L1	L1	L1	L1	L1
Current	10 A	10 A	2.6 A	10 A	1.3 A
Power	2.3 kW	2.3 kW	0.6 kW	2.3 kW	0.3 kW

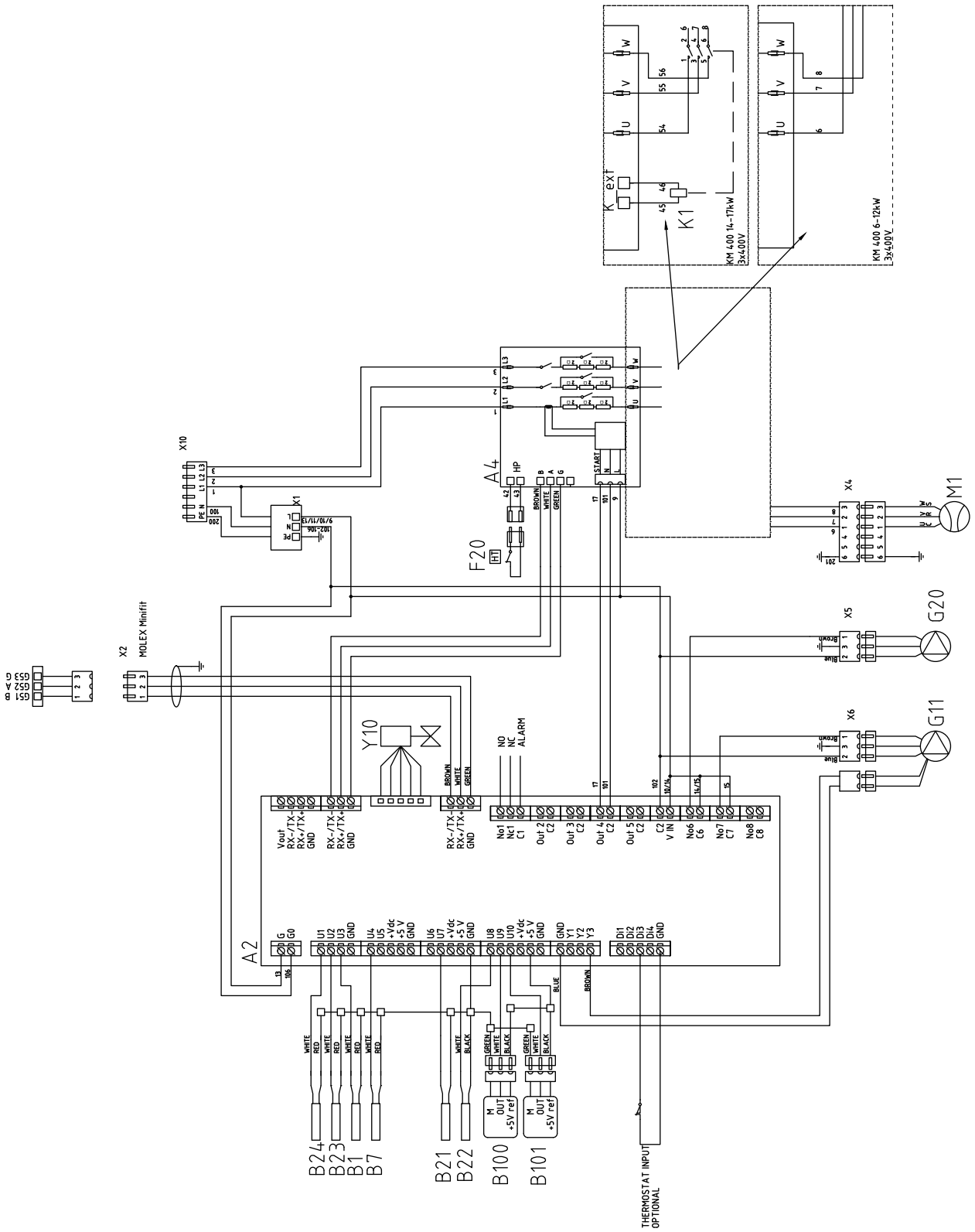


11.3 Tank schematic diagram 400V 3N~




A1 - DISPLAY BOARD
B6
B5
K19
COM A1
COM HP
B7
K20
Current trancducer 1
Current trancducer 2
Current trancducer 3
12 V
230 V
HP - TARIF
OPTION
B11
B2
B1
B15
B12
Y1
Y2
Y21

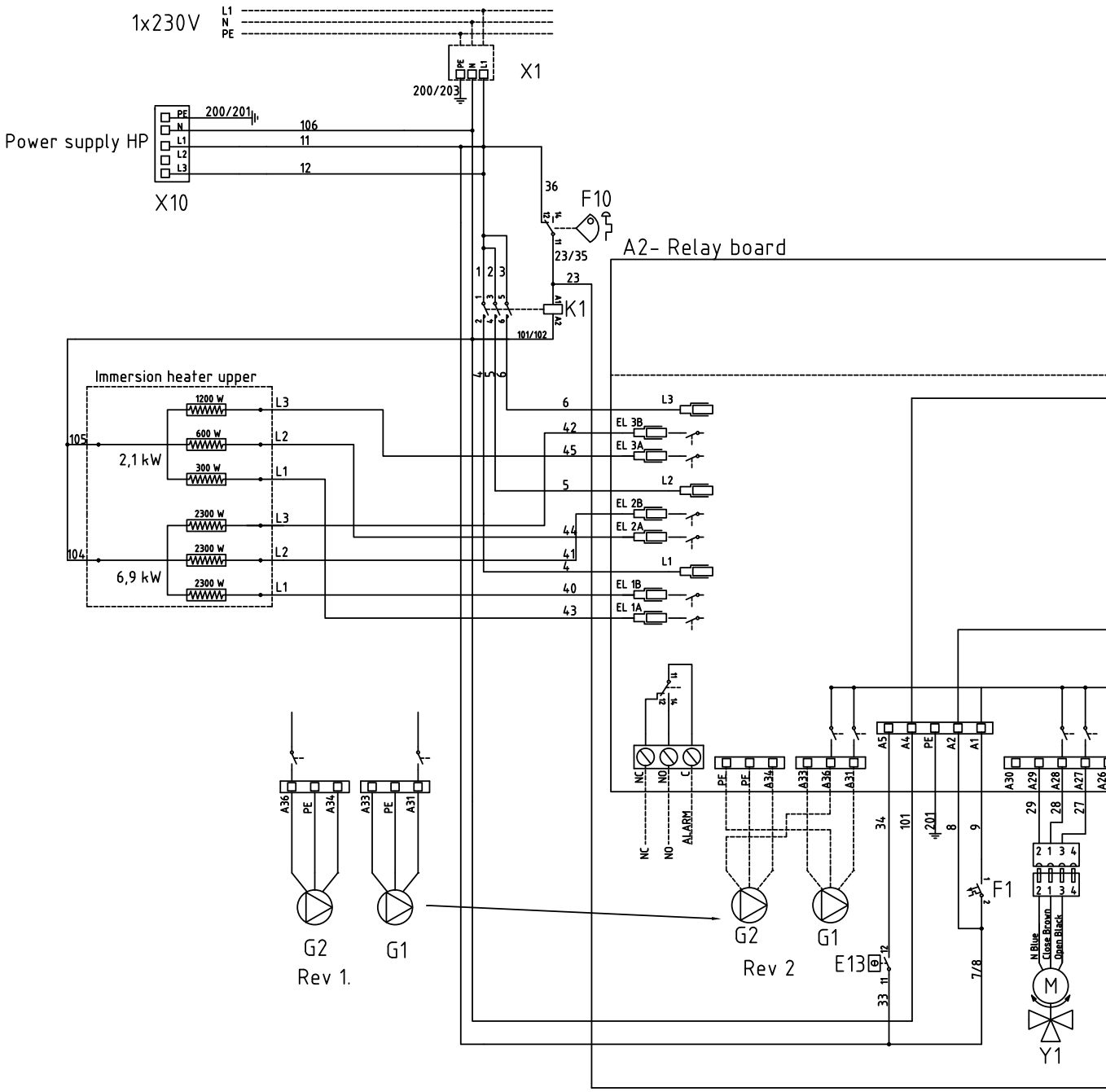
11.4 Cooling module schematic diagram 400V 3N~

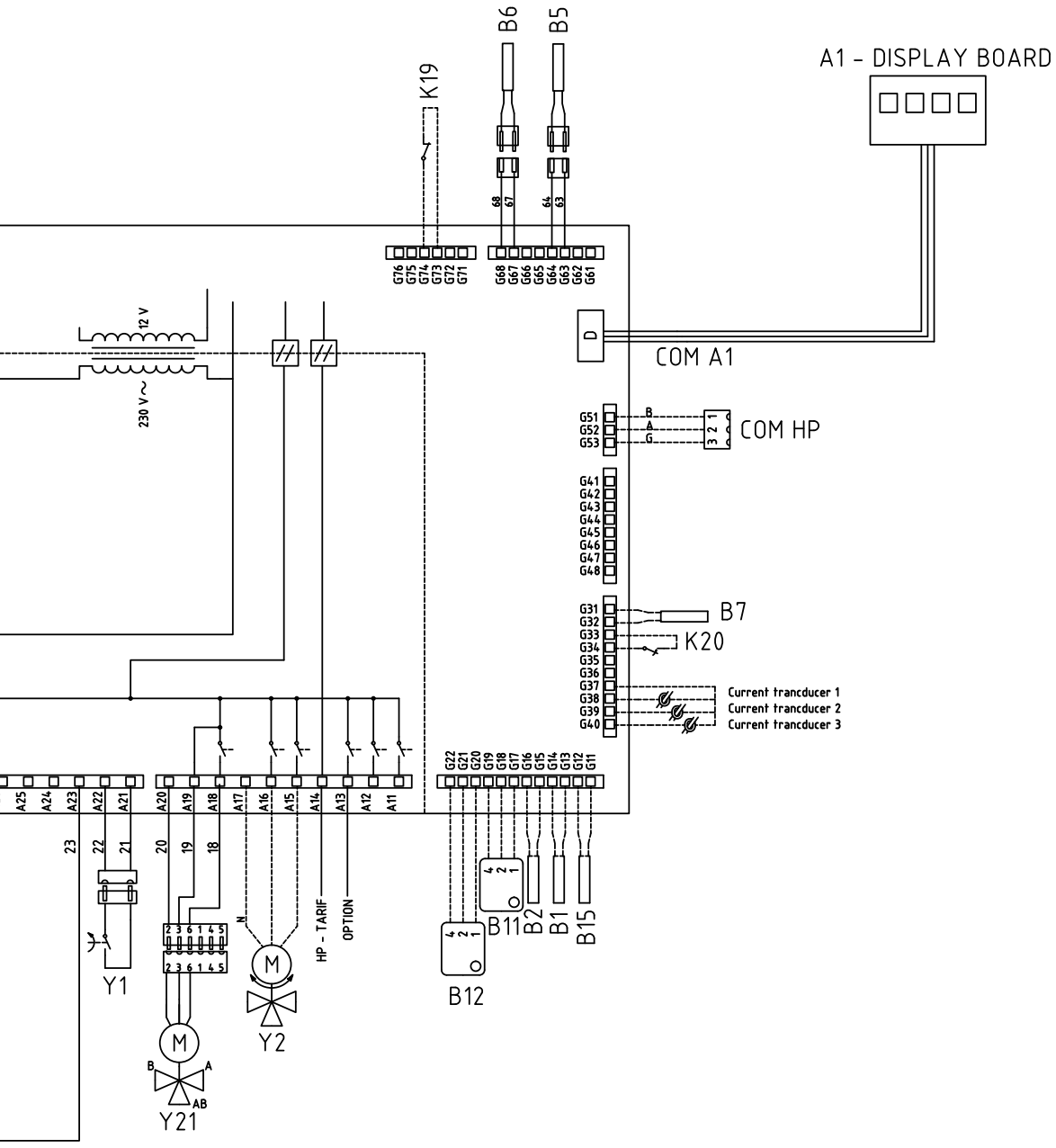


11.5 Parts list 400V 3N~

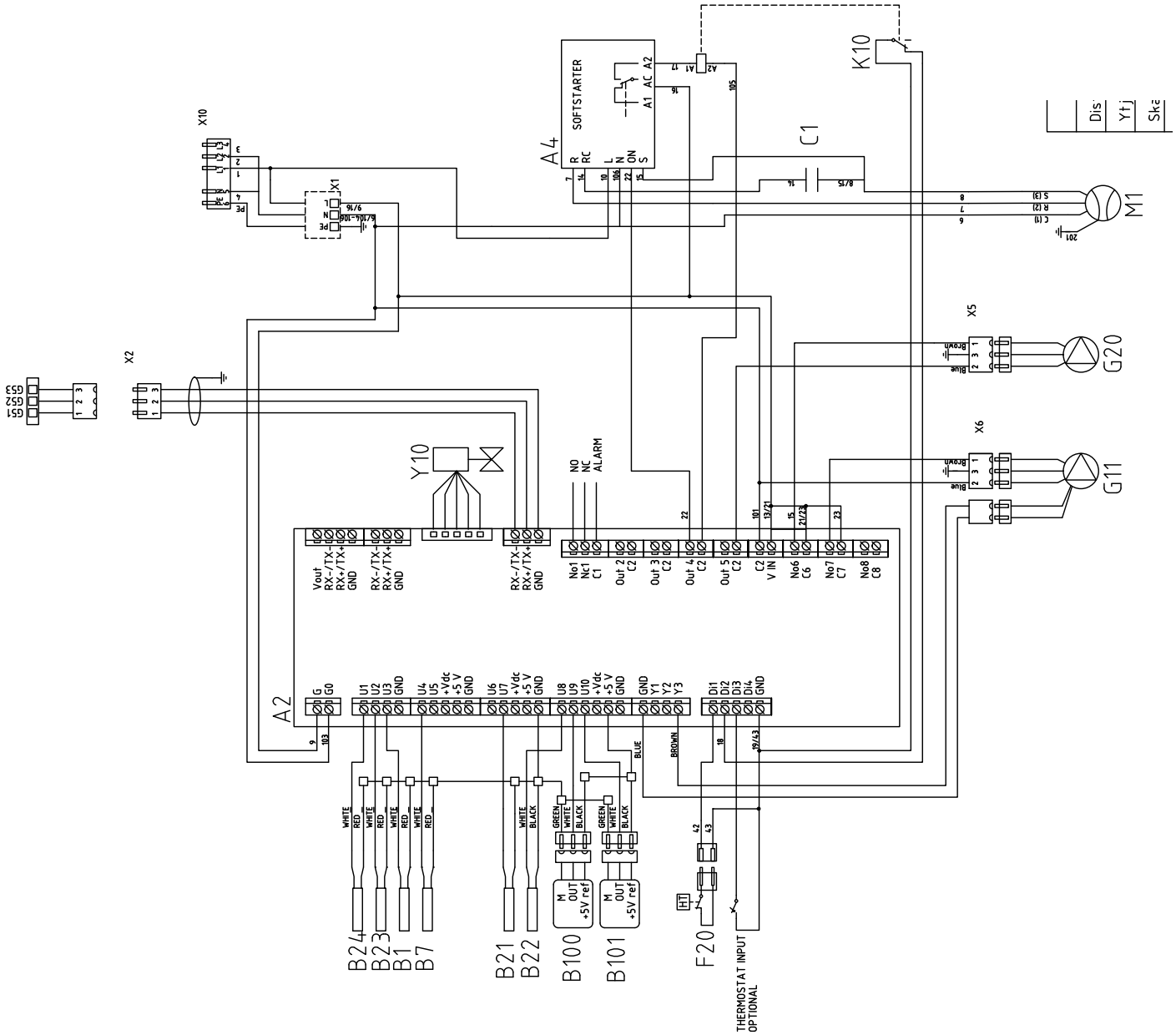
A1	Display PCB
A2	Rela/main PCB
A4	PCB white softstarter, motorprotection and contactctorfunction
B1	Primary flow 1
B2	Primary flow 2
B5	Temp Tank upper sensor
B6	Temp Tank Lower sensor
B7	Return sensor
B11	Indoor sensor 1
B12	Indoor sensor 2
B15	Outdoor sensor
B21	Hotgassensor
B22	Suctiongassensor
B23	Brinesensor in
B24	Brinesensor out
B100	Highpressure sensor
B101	Lowpressure sensor
E13	Spare thermostat
F1	Aut Fuse
F10	Aut Fuse
F20	Highpressure switch
G1	Radiator pump 1
G2	Radiator pump 2
G11	Loadpump 1
G20	Brinepump
K1	Contactor 1
K19	Pressure/ Flow Switch
K20	Night red/cirkulation/extra hot water
M1	Kompressor
X1	Terminal
X10	Terminal
Y1	Mixing valve 1
Y2	Mixing valve 2
Y21	Reverse valve DHW

11.6 Tank schematic diagram 230V 1N~




B6
B5
A1 - DISPLAY BOARD
K19
COM A1
COM HP
B7
K20
Current trancducer 1
Current trancducer 2
Current trancducer 3
B11
B2
B1
B15
B12
Y1
Y2
Y21
HP - TARIF
OPTION
12 V
230 V ~

11.7 Cooling module schematic diagram 230V 1N~



11.8 Parts list 230V 1N~

A1	Display PCB
A2	Rela/main PCB
A4	PCB white softstarter, motorprotection and contactctorfunction
B1	Primary flow 1
B2	Primary flow 2
B5	Temp Tank upper sensor
B6	Temp Tank Lower sensor
B7	Return sensor
B11	Indoor sensor 1
B12	Indoor sensor 2
B15	Outdoor sensor
B21	Hotgassensor
B22	Suctiongassensor
B23	Brinesensor in
B24	Brinesensor out
B100	Highpressure sensor
B101	Lowpressure sensor
C1	Capacitator compressor (1-phase)
E13	Spare thermostat
F1	Aut Fuse
F10	Aut Fuse
F20	Highpressure switch
G1	Radiator pump 1
G2	Radiator pump 2
G11	Loadpump 1
G20	Brinepump
K1	Contactor 1
K10	Relay
K19	Pressure/ Flow Switch
K20	Night red/cirkulation/extra hot water
M1	Kompressor
X1	Terminal
X10	Terminal
Y1	Mixing valve 1
Y2	Mixing valve 2
Y10	Expansion valve
Y21	Reverse valve DHW

12. Sensor Resistance

NTC 22K

Temperature °C	Brine, HP, Boiler, Flow Sensor, Room Sensor Resistance Ω
130	800
125	906
120	1027
115	1167
110	1330
105	1522
100	1746
95	2010
90	2320
85	2690
80	3130
75	3650
70	4280
65	5045
60	5960
55	7080
50	8450
45	10130
40	12200
35	14770
30	18000
25	22000
20	27100
15	33540
10	41800
5	52400

NTC 150

Temperature °C	Outdoor sensor Resistance Ω
70	32
65	37
60	43
55	51
50	60
45	72
40	85
35	102
30	123
25	150
20	182
15	224
10	276
5	342
0	428
-5	538
-10	681
-15	868
-20	1115
-25	1443
-30	1883
-35	2478
-40	3289

13. First start

When CTC EcoHeat is delivered, the compressor is blocked to avoid it being unintentionally started. The heat pump can be installed and started before the brine circuit is put into operation.

CTC EcoHeat can also be started without a room sensor being fitted as the curve which has been set then regulates the heating. Deselect the room sensor in the Settings menu. The sensor can however always be fitted for the alarm LED function.

Before first start

1. Check that the heating boiler and system are full of water and have been bled. (CTC EcoHeat is bled through the safety valve on top.)
2. Ensure that the brine system is filled with water and antifreeze and that it is bled, or ensure that the compressor is blocked.
3. Check that all connections are tight.
4. Check that sensors and the radiator pump are connected to the power source.
5. The backup heating thermostat has OFF as its factory setting. The recommended position is ❄ = Antifreeze setting, around + 7 °C. The backup heating thermostat is reset on the electrical switchboard behind the front panel. It is in the OFF position when it is turned anticlockwise as far as it will go (the screwdriver slot should be vertical).

At the end of the installation, check the current transformer's connection. In this situation it is important that you have switched off any major consumers of electricity. Also make sure that the backup thermostat is closed.

Symbol for backup heating thermostat:

First start

Switch on the power using the safety switch. The display comes on. The heat pump now asks the following:

1. Select the language and press OK.
2. Confirm that the system is filled with water and press OK.
3. Size of main fuse Choose between 10 and 35 A.
4. Specify the maximum electric heater power. Choose between 0.0 and 9.0 kW in steps of 0.3 kW.
5. Select the option permitting the compressor to operate (if the collector system is ready). When the compressor is started for the first time, it is automatically checked that it is running in the correct direction. An error message is displayed in the panel display if it is rotating in the wrong direction. Switch any two phases to change the direction of rotation. Use your hand to feel that the hot gas pipe immediately becomes warm when the compressor starts, but bear in mind that the pipe may be hot!
6. Brine pump on 10 days.
7. Specify the max. primary flow °C for radiator system 1.
8. Specify the inclination for radiator system 1.
9. Specify the adjustment for radiator system 1.
   If the primary flow sensor for radiator system 2 is installed, repeat steps 7-9 for radiator system 2.
10. The heat pump then starts and the start menu appears.

! The maximum power output must be written on the rating plate with a marker.

! Save these settings under: Installer/ Settings/Save settings

Enertech Group

Försäkran om överensstämmelse
Déclaration de conformité
Declaration of conformity
Konformitätserklärung

Enertech AB

Box 313

S-341 26 LJUNGBY

försäkrar under eget ansvar att produkten

confirme sous sa responsabilité exclusive que le produit,

declare under our sole responsibility that the product,

erklären in alleiniger Verantwortung, dass das Produkt,

EH 400

som omfattas av denna försäkran är i överensstämmelse med följande direktiv,

auquel cette déclaration se rapporte est en conformité avec les exigences des normes suivantes,

to which this declaration relates is in conformity with requirements of the following directive,

auf das sich diese Erklärung bezieht, konform ist mit den Anforderungen der Richtlinie,

EC directive on:

Pressure Equipment Directive 97/23/EC, Module A

Electromagnetic Compatibility (EMC)EN2004/108/EC

Low Voltage Directive (LVD) EN2006/95/EC

Överensstämmelsen är kontrollerad i enlighet med följande EN-standarder,

La conformité a été contrôlée conformément aux normes EN,

The conformity was checked in accordance with the following EN-standards,

Die Konformität wurde überprüft nach den EN-normen,

EN 60335-1:1995

EN 60335-2-40:2003

EN 55014-1 /-2:2007

EN 61 000-3-2:2006

EN 61000-4-2, -3, -4, -5, -6, -11:2006

Ljungby 2013-06-26

Marcus Miller

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